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ABSTRACT

The goal of the Developmental Approaches in Science, Health and Technology (DASH) program is to preserve the curiosity and capture the imagination of all elementary students through an experience of science, technology, and health that engages them in the excitement of exploring and understanding the unknown, inventing and building to solve problems, becoming better able to care for themselves, and gaining basic meaningful knowledge that will enable further school study. This document contains a teacher's guide for 1st grade level. The document is divided into sections based on content. Activities include: (1) Learning; (2) Time, Weather and Sky; (3) Animals; (4) Plants; (5) Food and Nutrition; (6) Health and Safety; (7) Wayfinding and Transportation; (8) Energy and Communication, Conservation, Recycling, and Decomposition; (10) Matter, Space and Construction; (11) Start-up Activities; (12) Activity Plans; (13) Scope and Sequence; (14) Material List; and (15) Complimentary Materials. Each lesson plan includes objectives, background, student role, required materials, product, and procedure information. (Author/YDS)

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Grade 1
Teacher Guide

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DASH

Developmental Approaches in Science, Health and Technology

SE067328

CRDG Curriculum Research & Development Group
University of Hawai‘i

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DEVELOPMENTAL APPROACHES IN SCIENCE, HEALTH AND TECHNOLOGY (*DASH*) PROGRAM
GRADE 1 TEACHER GUIDE

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GRADE ONE
CLUSTER 1

Learning

1.1.1 The Learning Calendar
1.1.2 The Responsibility Chart
1.1.3 The Planning Calendar
1.1.4 Things Learned Last Year
1.1.5 Helping
1.1.6 Working Together
1.1.7 Taking Turns and Sharing
1.1.8 Concept-and-Skill Inventory

1.1.1 THE LEARNING CALENDAR

OBJECTIVES

The students
- Keep data on moon phase, temperature, wind, and weather conditions.
- Record three or more things they learn each day.
- Make predictions based on previously recorded data.
- Experience a concrete representation of past, present, future, and time units.

BACKGROUND

This activity continues the Learning Calendar started last year. In kindergarten, the calendar focused on present and past events. In grade 1 the future is emphasized. Students use information from the calendar to plan and make predictions.

The calendar should be started during the first week of school. It gives students a sense of continuity and supports the time-length metaphor—long time, short time, before, after, etc. Heavy-duty computer paper can be used. The calendar can also be recorded on a roll of chart paper. Initially, date, temperature, weather observations, moon phase, wind, and three or more things learned or experienced each day should be recorded. Samples of art projects, newspaper clippings, field trip brochures, etc., can also be attached to the calendar. Other information will be added during the year. See Activity 1.2.1 SKY AND WEATHER WATCH.

Data should be recorded both in pictures and words. This technique supports the development of language skills. The teacher may want to record the data in the beginning of the year. The students should take over this responsibility as soon as possible. A time-management technique is to record the meteorological observations and special events during the morning opening activities and the learning experiences during the afternoon summary.

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The calendar should be unrolled periodically throughout the year. Monthly is ideal; quarterly is probably minimal. This can be done as a part of a big event such as Parents' Night. The unrollings are good opportunities to collect data needed for other activities. Groups can be assigned to collect information on temperature, weather, moon phases, birthdays, lost teeth, etc.

STUDENT ROLES

Data keeper
Reporter
Meteorologist
Astronomer

MATERIALS

DASH Calendar in a Box or a roll of white chart paper, 24" wide
colored markers
Student Page 1.1.1 CALENDAR REVIEW

PRODUCTS

Class Learning Calendar
Completed Student Pages

PROCEDURES

1. **Review the kinds of information the students put on the calendar in kindergarten.**

   Point out that we again will keep these data and that we will add more information to our calendar as the year progresses.

2. **Begin a first grade Learning Calendar.**

   Record daily
   - Day and date
   - Weather
   - Wind information
   - Temperature
   - Moon phase

- Special events as appropriate
- Three or more learning events or experiences

3. Unroll the Learning Calendar with the students.

- Ask whether there are events that seem to be connected? Which ones? How?
- Emphasize sequence, cause and effect, like and different, past, present, and future.
- Make predictions about things that may appear on the calendar in the future. How long will our calendar be in another month? Where will a particular holiday appear on the calendar.
- Collect information needed for other activities. Use Student Page 1.1.1 CALENDAR UNROLLING.

EXTENSIONS

- Explore various ways to make data collection more efficient.
- Have the students begin to make predictions by asking questions such as these:
    - What kind of weather do you think we will have tomorrow?
    - What makes you think so?
    - What do you think the phase of the moon will be tomorrow?
    - What makes you think so?

1.1.2 THE RESPONSIBILITY CHART

OBJECTIVES

The students
- Plan for the carrying out of classroom jobs.
- Record the completion of their assigned responsibilities.

BACKGROUND

This is a follow-up to Activity 1.1.1 THE LEARNING CALENDAR. Because there are many projects and jobs, it is important that a record be kept of who is assigned to which job in which project.

It is suggested that a short time on Monday mornings or Friday afternoons be set aside for checking the responsibility chart. Additional responsibilities can be added to the chart at any time. Most jobs should be rotated regularly.

STUDENT ROLES

Planner
Recorder

MATERIALS

Class Responsibiliy Chart
marking pens
Student Page 1.1.2 JOBS AT HOME

PRODUCTS

Class Responsibility Chart
Completed Student Pages

PROCEDURES

1. **Introduce and demonstrate the use of the Class Responsibility Chart.**

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Ask such questions as these:

- Why do we need a class responsibility chart?
- Why is it important to keep a record of who does what jobs?
- What jobs need to be done?
- Why should we report or check off that we have done our job?
- What happens when we do not do the things that we have agreed to do?
- What should we do if someone is absent?

2. **Have the class create a list of jobs that need to be done.**
   - Discuss what kind of jobs need to be done to keep the classroom neat, clean, and running smoothly.
   - Review the care needed for any class pets.
   - Make a list of the data that need to be collected daily.
   - Ask if there are any jobs for special projects that need to be added to the list.
3. **Set up and decide on recording procedures for the Class Responsibility Chart.**
   - Put the jobs on the chart.
   - Decide on a job selection and rotation process.
   - Have students volunteer for or assign them to the jobs.
   - Post individual job descriptions and reminders in the appropriate job areas.
4. **Review the list periodically and rotate the job assignments weekly. Have students suggest ways for improvement in the way jobs are being done.**

EXTENSION

- Send a letter home explaining the use of Student Page 1.1.2 JOBS AT HOME.

1.1.3 THE PLANNING CALENDAR

OBJECTIVES

The students
- Keep a planning calendar.
- Develop a sense of the future.

BACKGROUND

This activity encourages students to anticipate and plan for holidays, vacations, birthdays, major school events, and classroom projects.

Students invent a system to remind the class of upcoming events by using the planning calendar. This is a standard calendar on which all important events are written. The calendar shows the whole year on one large sheet. It specifies a weekly planning time when future events are discussed. This is the interface to Activity 1.1.2 THE RESPONSIBILITY CHART. Planning is probably best done on the first or last day of the week.

STUDENT ROLE

Planner

MATERIALS

calendar for the year on a single page
Student Page 1.1.3 MONTHLY PLANNING CALENDAR

PRODUCTS

Class Planning Calendar
Completed Student Pages

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PROCEDURES

1. **Introduce the class planning calendar. Discuss the need to know about future events and how they will be recorded.**

   Ask such questions as these:
   - What month are we in?
   - Can you find this month's section?
   - What is today's date?
   - Can you find it on the calendar?
   - Does anyone have a birthday this month? When?

2. **Record one month's data on the class planning calendar while students write on Student Page 1.1.3 MONTHLY PLANNING CALENDAR.**

   Ask the question
   - Are there any special events this month?
     ✔ Specify

   Have students write in a code letter on Student Page 1.1.3 MONTHLY PLANNING CALENDAR for the following events

EVENT	CODE
Birthday	B
Holiday	H
School Events	S
Classroom Events	C
Vacation Days	V

3. **Update the class planning calendar once each week at planning time or as appropriate to plan for future events and projects.**

1.1.4 THINGS LEARNED LAST YEAR

OBJECTIVES

The students
- Recall things learned in kindergarten.
- Reactivate their long-term records.

BACKGROUND

This activity helps the students recall things they learned in kindergarten. Pictures, songs, dances, and verses help them remember events. The students review kindergarten routines. This activity is an introduction to DASH for new students. Enlist the help of the kindergarten teacher concerning last year's routines. The activity also reactivates and reviews the use of student Sceince Record Books, the class Working Dictionary, the class Wonder and Discover Book, and the class Connections Book. Ideally, these will have been stored in the library or in the students' kindergarten classroom over the summer. The ceremonious retrieval of their records reinforces the importance of information in science. If students are new to DASH, it might be best to do the kindergarten activities K.1.6-8 to introduce the idea of working definitions.

STUDENT ROLE

Historian

MATERIALS

individual Science Record Books from kindergarten
the class Working Dictionary from kindergarten
the class Wonder and Discover Book from kindergarten
the class Connections Book from kindergarten
chart paper
oaktag
marking pens
Student Page 1.1.4 THINGS LEARNED LAST YEAR

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PRODUCTS

First Grade Working Dictionary
First Grade Wonder and Discover Book
First Grade Connections book
Completed Student Pages

PROCEDURES

1. **Review routines for cleanliness, planning the day, equipment storage, responsibility, and working together routines from kindergarten.**

   Ask such questions as these:
   - When do we wash our hands?
   - How do we wash our hands?
   - Why do we wash our hands?
   - What will help us remember when and how to wash our hands?
   - Why do we plan our day?
   - Why do we always put things back where we stored them?
   - Why do we need to know our responsibilities?
   - Why do we need to work together?

   Continue reviewing kindergarten routines until the students remember or reconstruct them.

2. **Retrieve the kindergarten Science Record Books and discuss the need for students to record this year's activities in their new Science Record Books.**

   Do this with ceremony to emphasize the importance of records.
   - Compare what the students have in their books from last year.
   - Discuss the entries they made.

Ask such questions as these:
- What is the first thing in your kindergarten Science Record Book?
- What does your book tell us about what you learned last year?
- What is the reason for keeping a Science Record Book?

Have the students
- Store books in their cubbies or on a special shelf.
- Complete Student Page 1.1.4 THINGS LEARNED LAST YEAR.

3. **Review the use of The Working Dictionary with the students.**

- Review the working definitions the students created in kindergarten and how they were made.
- Discuss the need for a continuing Working Dictionary to record new and revised ideas learned in first grade.
- Construct a new Working Dictionary or add more pages to the one from kindergarten.

4. **Review the questions in the kindergarten Wonder and Discover Books with the students.**

Ask such questions as these:
- Are there any questions we found the answers to?
- Are there any questions we are still wondering about?
- Have you any new ideas about our old questions?
- Do we have any new questions we need to discover answers for?

Construct a new first grade Wonder and Discover Book. Recopy any yet unanswered questions the students are still puzzled about from kindergarten. As an alternative the kindergarten book can be continued.

5. **As the students work with the concepts included in the kindergarten Connections Book, have them review and add to the connections that were recorded.**

Ask such questions about the particular concept as these:
- Who else does this? (Career connections)
- Where else have you seen this?
- What uses does this have?

Encourage the students to look for connections to other DASH activities and schoolwork.

Construct a new first grade Connections Book or continue with the one begun in kindergarten.

1.1.5 HELPING

OBJECTIVES

The students
- Name things they can do for others.
- Name things they can do for themselves.
- Make goals for learning to do new things.
- Take responsibility to do things for themselves and others.

BACKGROUND

In this activity students discuss the things they know that help them take care of themselves. They also discuss things they do for others such as taking care of pets, helping family members, etc. Finally, they set goals for learning new things.

At the end of year, students decide whether they reached their goals.

STUDENT ROLE

Goal setter

MATERIALS

Student Pages	1.1.5A THINGS I DO FOR MYSELF
	1.1.5B THINGS I DO FOR OTHERS
	1.1.5C THINGS I WANT TO LEARN TO DO

PRODUCTS

Inventory and goals
Completed Student Pages

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PROCEDURES

1. **Have students make an initial inventory. Identify New Year's as a time of self-evaluation and goal setting.**

Introduce the Student Page 1.1.5A THINGS I DO FOR MYSELF. Help students find and record things they have recently learned that they can do for themselves.

Ask students
- What things do you do for yourself now that you did not do last year?

Help students name things they can do for others. Use Student Page 1.1.5B THINGS I DO FOR OTHERS to record these.

Ask such questions as these:
- What things do you do for other people?

- What do other people do for you now that you might learn to do for yourself?

Help students name things they want to learn to do by the end of the year. Make lists. Use Student Page 1.1.5C THINGS I WANT TO LEARN TO DO.

Ask questions such as these:
- What things do you want to learn to do for yourself this year?

- What things do you want to learn to do for other people this year?

Have students put these pages in their Science Record Books for later use.

2. **Make a follow-up inventory at mid semester.**

Ask questions such as these:
- Have you learned to do some of the things you set out to learn?

- Did you learn to do things that were not on your list? Write them in.

- What new goals do you have?

3. **Make an end-of-the-year inventory of goal achievement.**

At the end of the year, have students check their progress. Review Student Pages and lists.

Ask questions such as these:
- Have you learned to do the things you set out to learn?
- Did you learn to do the things that were not on your list? Write them in.
- What new goals do you have?

1.1.6 WORKING TOGETHER

OBJECTIVES

The students
- Begin to reflect on reasons for cooperative work.
- Begin to reflect on reasons for individual work.
- Identify when and why they should sometimes work together.
- Identify when and why they should sometimes work alone.

BACKGROUND

Introduce this activity when students are not working well together. It asks students to think about working together and working alone.

Students will discover that when working at a project by themselves they have to do all the tasks alone. When working in groups, they can share tasks.

STUDENT ROLE

Philosopher

MATERIALS

Student Page 1.1.6 WORKING TOGETHER

PRODUCT

Completed Student Pages

PROCEDURES

1. **Discuss with students why we sometimes work together in groups.**

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Elicit such reasons as these:

- Need for many hands.
- Need for different talents.
- Need for sharing knowledge.
- Need for sharing resources.
- Need to settle differences and cooperate.
- Need for mutual support.
- The fun of working together.
- The joy of sharing in a common project.
- Some people prefer group work.
- The best way for the job to get done.

2. **Discuss why we sometimes work alone.**

Work toward such reasons as these:

- The task needs only one person.
- Only one person is available to do the task.
- One person has the talents to do the task.
- One person has the information to do the task.
- Resources are sufficient for the individual to carry out the task.
- There is no conflict of interest or conflicts are not being considered.
- There is sufficient self-motivation to complete the task on one's own.
- Preference for individual work.
- The best way to do the particular job.

3. Discuss the problem of deciding when to work with a group or alone.

Ask questions such as these:

- What are the things that have to be done on this project?
- In what order do they have to be done?
- Can I do all the things by myself?
- Can I do things faster with other people?
- Can I do things better with other people?
- Does the assignment ask me to do the things myself or with other people?
- Are there enough resources for me to work alone?

EXTENSION

- Use puppets and role-playing to get less verbal students involved in general discussions.

DASH 1.1.7 TAKING TURNS AND SHARING

OBJECTIVES

The students
- Find solutions to conflicts over taking turns and sharing.

BACKGROUND

Use this activity when friction about taking turns and sharing occurs. These are role-played discussions built around two stories. The first story is about taking turns and the second story is about sharing. Both stories are unresolved so students can create and discuss their own solutions.

STUDENT ROLE

Social planner

MATERIALS

Two Villages Stories
props as invented by students

PRODUCT

Role play

PROCEDURES

1. **Tell the following story.**

Story 1. Village Red and Village Blue used the same stream for watering their gardens. In the summer the stream almost dried up and the villages sometimes fought over the water that was left. One day an engineer came by and told the villagers there was plenty of water. The engineer offered to help build a dam if the villages would work together. They agreed and built the dam. But now only one village could water its gardens at a time,

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so to be fair the engineer gave each village a key to the irrigation gate and made the lock so that both keys had to be used at the same time to open the gate.

The next spring the reservoir filled as the engineer said it would, and both villages looked forward to big gardens. However, the next summer when it came time to irrigate, both villages needed water at the same time, so each village refused to give the other the key.

2. **Discuss the story and solve the problem.**

Some suggested questions are these:

- What will happen if the villagers do not solve their problem?
- As a wise judge, how would you solve the problem?
- How would you decide who goes first?
- How would you solve the problem of how long one village should irrigate before the other village gets its turn?
- How can we decide who should go first?
- How can we be sure we are fair while sharing in the classroom?
- How can we decide how long someone should use something that others want to use?
- How do we decide the order when many people must take turns?

3. **Have students role-play the villagers presenting their case to a judge and jury.**

4. **Tell the second story.**

Story 2. Once upon a time Village Purple and Village Orange used a stream for watering their gardens. There was plenty of water, but Village Purple opened up more fields and built a dam across the stream to get more water. When Village Orange wanted water, Village Purple said it was sorry but it was using the water for its gardens.

Ask such questions as these:

- What will happen if the villagers do not solve their problem?
- As a wise judge, how would you solve the problem?
- How can we be sure people are not hoarding things that we need to share in the classroom?
- How can we properly share such items and still have enough for the future?

5. **Have students role-play their solutions to the second story.**

1.1.8 CONCEPT INVENTORY

OBJECTIVES

The students
- Use their capacity to teach in evaluating their knowledge of concepts and skills.
- Evaluate their knowledge of concepts and skills.

BACKGROUND

In this activity students learn about what it means to teach someone something. This is done by reading and discussing the focus book, THERE'S A NEW KID COMING. The children will probably realize that they have already done a considerable amount of teaching throughout DASH.

The second part of this activity is a concept inventory. This is a self-evaluation done by the students. The primary objective is to promote an awareness of their own knowledge as they perceive it. The teacher's assessment may be quite different. The students' evaluations may be placed in the Science Record Books and passed on to next year's teacher. In following years the students can look back and see how they thought they were doing in the first grade. At that time the children may well pick up on any inaccuracies.

When giving the Concept Inventory, the teacher should change the terminology of the script to match the language that was used in the classroom. The inventory takes about 30 minutes. It may be given in one or two sessions. The answers (No, Yes, Teach) are to be circled. See the script for further instructions.

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Teacher evaluation of the students can also be done using the Concept Inventory. There is a section included that lists the concepts and skills with a space for each student's name. The teacher rates the students prior to giving them the inventory. Where there are large discrepancies in teacher and student evaluations, the discrepancy can be tested. For example, if a teacher feels a student has no knowledge of the meaning of a "calendar" and the student says she can teach someone the meaning of the term, resolve the discrepancy by having the student teach the meaning to the teacher.

STUDENT ROLE

Evaluator

MATERIALS

Focus Book THERE'S A NEW KID COMING
Grade One Concept Inventory
Script
Teacher Evaluation Pages

PRODUCT

Completed Concept Inventories

PROCEDURES

1. Read and discuss THERE'S A NEW KID COMING.

Some suggested questions are these:

- Has someone taught you how to do something?
- How did they teach you?
- Have you ever taught someone how to do something?
- How did you do it?
- Has someone ever explained something to you? How?
- Have you ever explained something to someone?
- How did you do it?

2. The teacher evaluates the students using the Teacher Evaluation Pages. (Optional)

3. Have students complete the Concept Inventory.

4. Evaluate any great discrepancies between teacher and student responses.

DASH First Grade Concept Inventory
SUGGESTED SCRIPT

CONCEPTS:

There are three possible answers to each of the following questions: "No," I do not know what the word means. "Yes," I do know what the word means. And, I can "teach" the meaning of this word to a friend who does not know its meaning. Please circle one answer only: no, yes, or teach.

1. Do you know what a calendar is? ...No, I do not know what a calendar is; Yes, I do know what a calendar is; or, I can teach the meaning of calendar to a friend who does not know what a calendar is. Put a circle around your best answer.
2. Do you know what responsibility means? Continue as above until all students understand the pattern.
3. Do you know what cooperation means?
4. Do you know what a plan is?
5. Do you know what rules are?
6. Do you know what safety means?
7. Do you know what a season is?
8. Do you know what a moon cycle is?
9. Do you know what future means?
10. Do you know what an hour is?
11. Do you know what a minute is?
12. Do you know what sunrise means?
13. Do you know what horizon means?
14. Do you know what temperature means?
15. Do you know what a boundary is?
16. Do you know what an animal is?
17. Do you know what a plant is?
18. Do you know what once living means?
19. Do you know what decomposition is?
20. Do you know what a survey is?
21. Do you know what environment means?
22. Do you know what space means?
23. Do you know what air is?
24. Do you know what a gas is?
25. Do you know what exhale means?
26. Do you know what a food is?
27. Do you know what germinate means?
28. Do you know what nutrition means?
29. Do you know what ARF means?

30. Do you know what incisors are?
31. Do you know what plaque is?
32. Do you know what growth means?
33. Do you know what healthy means?
34. Do you know what sanitation means?
35. Do you know what prevention means?
36. Do you know what moisture is?
37. Do you know what a sewer is?
38. Do you know what float means?
39. Do you know what a balance is?
40. Do you know what mass is?
41. Do you know what energy is?
42. Do you know what heating means?
43. Do you know what conservation means?
44. Do you know what distance means?
45. Do you know what a area is?
46. Do you know what a meter is?
47. Do you know what a model is?
48. Do you know what a length is?
49. Do you know what science is?
50. Do you know what technology is?

SKILLS:

1. Do you know how to cooperate? ...No, I do not know how to cooperate.
   Yes, I know how to cooperate, or I can teach a friend how to cooperate who does not know about cooperating. Put a circle around your best answer.

2. Do you know how to make a plan and then follow it? ...No, yes, or I can teach a friend to make a plan and follow it who does not know about planning.

3. Do you know how to observe something? Continue as above if necessary.

4. Do you know how to measure temperature?
   ✔ Use a thermometer.

5. Do you know how to measure distance?
   ✔ Use a ruler.

6. Do you know how to measure volume?
   ✔ Use measuring cups, spoons, etc.

7. Do you know how to measure mass?
   ✔ Use a balance.

8. Do you know how to invent something?

9. Do you know how to predict that something will happen?

10. Do you know how to classify (group) things?

11. Do you know how to define something?
    ✔ Make up/create a working definition.

12. Do you know how to identify something new in the OSA?

13. Do you know how to record data (information)?

14. Do you know how to make and use a map?

15. Do you know how to build something?

DASH First Grade Concept Inventory

Name:____________________

Concepts

1.	calendar	no	yes	teach
2.	responsibility	no	yes	teach
3.	cooperation	no	yes	teach
4.	plan	no	yes	teach
5.	rules	no	yes	teach
6.	safety	no	yes	teach
7.	season	no	yes	teach
8.	moon cycle	no	yes	teach
9.	future	no	yes	teach
10.	hour	no	yes	teach

11.	minute	no	yes	teach
12.	sunrise	no	yes	teach
13.	horizon	no	yes	teach
14.	temperature	no	yes	teach
15.	boundary	no	yes	teach
16.	animal	no	yes	teach
17.	plant	no	yes	teach
18.	once-living	no	yes	teach
19.	decompose	no	yes	teach
20.	survey	no	yes	teach
21.	environment	no	yes	teach
22.	space	no	yes	teach

23.	air	no	yes	teach
24.	gas	no	yes	teach
25.	exhale	no	yes	teach
26.	food	no	yes	teach
27.	germinate	no	yes	teach
28.	nutrition	no	yes	teach
29.	ARF	no	yes	teach
30.	incisors	no	yes	teach
31.	plaque	no	yes	teach
32.	growth	no	yes	teach
33.	healthy	no	yes	teach
34.	sanitation	no	yes	teach

35.	prevention	no	yes	teach
36.	moisture	no	yes	teach
37.	sewer	no	yes	teach
38.	float	no	yes	teach
39.	balance	no	yes	teach
40.	mass	no	yes	teach
41.	energy	no	yes	teach
42.	heating	no	yes	teach
43.	conservation	no	yes	teach
44.	distance	no	yes	teach
45.	area	no	yes	teach
46.	meter	no	yes	teach

47.	model	no	yes	teach
48.	length	no	yes	teach
49.	science	no	yes	teach
50.	technology	no	yes	teach

Skills

Name:____________________

1.	cooperate	no	yes	teach
2.	plan	no	yes	teach
3.	observe	no	yes	teach
4.	measure temperature	no	yes	teach
5.	measure distance	no	yes	teach
6.	measure volume	no	yes	teach
7.	measure mass	no	yes	teach
8.	invent	no	yes	teach
9.	predict	no	yes	teach
10.	classify	no	yes	teach
11.	define	no	yes	teach
12.	identify	no	yes	teach
13.	record	no	yes	teach
14.	map	no	yes	teach
15.	build	no	yes	teach

GRADE 1 TEACHER ASSESSMENT (Page 1)

KEY N = No Y = Yes T = Teach															
1. calendar															
2. responsibility															
3. cooperation															
4. plan															
5. rules															
6. safety															
7. season															
8. moon cycles															
9. future															
10. hour															
11. minute															
12. sunrise															
13. horizon															
14. temperature															
15. boundary															
16. animal															
17. plant															
18. once-living															
19. decompose															
20. survey															
21. environment															
22. space															
23. air															
24. gas															
25. exhale															
26. food															
27. germinate															

GRADE 1 TEACHER ASSESSMENT (Page 2)

KEY N = No Y = Yes T = Teach															
28. nutrition															
29. ARF															
30. incisors															
31. plaque															
32. growth															
33. healthy															
34. sanitation															
35. prevention															
36. moisture															
37. sewer															
38. float															
39. balance															
40. mass															
41. energy															
42. heating															
43. conservation															
44. distance															
45. area															
46. meter															
47. model															
48. length															
49. science															
50. technology															

GRADE 1 TEACHER ASSESSMENT (Page 3)

KEY N = No Y = Yes T = Teach															
1. cooperate															
2. plan															
3. observe															
4. measure temperature															
5. measure distance															
6. measure volume															
7. measure mass															
8. invent															
9. predict															
10. classify															
11. define															
12. identify															
13. record															
14. map															
15. build															

SP 1.1.1

DASH

CALENDAR REVIEW
1.1.1

Name: ____________________

Date: ____________________

HOW MANY DAYS?	HOW MANY WEEKS?	HOW MANY MONTHS?	HOW MANY SEASONS?	HOW MANY FULL MOONS?

HOTTEST DAY

DATE: ____________________

TEMPERATURE: ______ °C ______ °F

COLDEST DAY

DATE: ____________________

TEMPERATURE: ______ °C ______ °F

LONGEST DAY

DATE: ____________________

SUNRISE: ______ SUNSET: ______

SHORTEST DAY

DATE: ____________________

SUNRISE: ______ SUNSET: ______

Group Question: ____

What did we discover?

My Favorite Day

Date: ____________________

Why?

DASH

JOBS AT HOME
1.1.2

Name: ______________________

Date: ______________________

My Job	Mon	Tue	Wed	Thu	Fri	Sat	Sun

DASH

MONTHLY PLANNING CALENDAR 1.1.3

Name: ______________________

Date: ______________________

Month:

Sun	Mon	Tues	Wed	Thur	Fri	Sat

DASH

THINGS LEARNED LAST YEAR
SP 1.1.4

Name: ______________________

Date: ______________________

Draw or write about some things you learned in Kindergarten.

THINGS I DO FOR MYSELF
1.1.5A

Name: ____________________

Date: ____________________

Draw or write about some new things you can do for yourself.

DASH

THINGS I DO FOR OTHERS
1.1.5B

Name: ______________________

Date: ______________________

Draw or write about some things you do for others.

SP 1.1.5C

DASH

THINGS I WANT TO LEARN TO DO
1.1.5C

Name: ______________________

Date: ______________________

Draw or make a list of some things you want to learn to do for yourself and for others

FOR MYSELF	FOR OTHERS

DASH

WORKING TOGETHER
1.1.6

Name: ____________________

Date: ____________________

Draw pictures to show when you would like to work alone or with a group.

ALONE	GROUP

DASH

GRADE ONE
CLUSTER 2

Time, Weather, and Sky

1.2.1 Sky and Weather Watch
1.2.2 Rain and Streams
1.2.3 Snow and Streams
1.2.4 The Digital Clock
1.2.5 Hours and Minutes
1.2.6 Time Line
1.2.7 Sunrise and Sunset
1.2.8 Night and Day
1.2.9 The Sun
1.2.10 The Seasons
1.2.11 Making a Clock
1.2.12 Moonrise & Moonset

1.2.1 SKY AND WEATHER WATCH

OBJECTIVES

The students
- Review weather concepts.
- Create a pictorial concept map of weather.
- Invent weather logos.
- Add waxing and waning to their understanding of moon phases.
- Apply their understanding of direction to wind.
- Construct a compass.
- Define the concept of weather.

BACKGROUND

This activity should be started at the same time as Activity 1.1.1 THE LEARNING CALENDAR. The first six procedures review the concept of weather and the kinds of weather information that were collected in kindergarten and will continue to be collected in grade 1. Times of sunrise and sunset will be added to the Learning Calendar when Activity 1.2.7 SUNRISE AND SUNSET is done.

Students new to DASH and moon observing may benefit by doing kindergarten activities K.2.6 MOON WATCH and K.2.7 MOON PHASES. When students are confident with moon phases and the moon cycle, the terms "waxing" and "waning" can be introduced. Waxing describes the increasing size of the phases of the moon from the time of the new moon until the full moon. The moon is said to be waxing crescent and waxing gibbous. As the moon decreases in size from full to new it is referred to as a waning gibbous moon or a waning crescent moon.

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The addition of wind direction to the Learning Calendar should follow Activity 1.7.2 NORTH, SOUTH, EAST, AND WEST. Wind direction is determined by the direction from which the wind comes. A north wind comes from the north, blowing south. Establish a head (the point of attachment) and a tail for the wind detector. Then ask students where the head is pointing to help avoid confusion. An effective compass is made by pushing a magnetized nail lengthwise through a cork. An iron nail can be magnetized by stroking the nail lengthwise in one direction with a magnet. Float the compass in a shallow pan of water. A commercial compass can also be used.

STUDENT ROLES

Meteorologist
Astronomer

MATERIALS

Learning Calendar
Working Dictionary
corks, wine bottle size
iron nails
magnets
compass
thermometers
dowel, 1/2-1 meter long
lightweight fabric strip (1 m X 10 cm) or a wind detector
chart paper
marking pens
3 X 5 cards
glue or tape
Student Page 1.2.1A WEATHER WORDS
1.2.1B MOON MATCH-UP

PRODUCTS

List of weather words and logos
Daily weather information
Moon phase chart
Weather Concept Map
Working definition of weather
Completed Student Pages

PROCEDURES

1. **Review and discuss the weather information students put on their Learning Calendar in kindergarten.**

   - This should include weather (precipitation), wind (relative speed), temperature and moon phase. Check with the kindergarten teacher to see which data were recorded.

2. **Make a concept map about the weather with the students.**

   - Write the word "weather" in the center of a large piece of chart paper.

   - Have the students draw and label pictures on 3 X 5 cards of ideas relating to weather.
     ✔ The teacher may have to help with the labeling.

   - Build an interconnecting web on the chart paper using student pictures and ideas.

3. **Have the students make a list of weather words and logos to use on the calendar.**

   - Use Student Page 1.2.1A WEATHER WORDS to start students thinking about possible logos.

   - Words might include sunny, rainy, cloudy, etc.

4. **Review and practice how to read and hold a thermometer with the students. Have them record the temperature on the calendar.**

   - Remind the students to look at the thermometer straight ahead, not from above or below, and to hold the thermometer from the top or side edges.

   - Have the students decide when and where the temperature should be take.
     ✔ AM, PM, inside, outside, sun, shade, etc.
     and how to record it.
     ✔ °C, °F, or both.

5. **Have the students construct and practice using a wind detector and report the wind conditions on the calendar.**

   - A simple wind detector can be made with a dowel and a strip of fabric.

   - Have the students decide when and where to measure the wind.
     ✔ An open area is best.

   - Have the students decide how to record their observations.
     ✔ At this time, a picture of the effect of the wind on the wind detector is sufficient.

6. **Review and discuss the moon cycle with the students. Have them make a moon phase chart and record moon phases on the calendar.**

   Some suggested questions are
   - What do we mean by a full moon? New moon? Quarter moon? Crescent moon? Gibbous moon?

   - What is a moon cycle?

   - How could we find out the number of days it takes from one new moon to the next?

   - Have the students complete Student Page 1.2.1B MOON MATCH-UP.

   - Have the students count the number of days from one new moon to the next (one moon cycle) on the Learning Calendar.

7. **Add the terms "waxing" and "waning" to the students' moon observations when appropriate and record this information on the calendar.**

   Ask such questions as these:
   - What do we mean by a waxing crescent moon? Waxing gibbous moon?

   - What do we mean by a waning crescent moon? Waning gibbous moon?

8. **Have the students make a magnetic compass and then use their magnetic and body compasses to determine wind direction. See Activity 1.7.2 NORTH, SOUTH, EAST, AND WEST.**

   Add wind direction to the Learning Calendar weather information.

   Some suggested questions are
   - Which is the head of the wind detector?
   - Which is the tail of the wind detector?
   - If the head of the wind detector is pointing
     ✔ north, south, east, west in which direction is the tail blowing?
   - If the head of the wind detector is pointing
     ✔ north, south, east, west which direction is the wind coming from?
   - How shall we record wind direction on our Learning Calendar?

9. **Have the students add the time of sunrise and sunset to the Learning Calendar when they do Activity 1.2.7 SUNRISE AND SUNSET.**

10. **Have the students create a working definition for weather and record it in the Working Dictionary.**

EXTENSION

- Have the students record major weather events on the Learning Calendar. These could include things such as tornadoes, hurricanes, etc. Newspaper reports can be attached to the Learning Calendar.

1.2.2 RAIN AND STREAMS

OBJECTIVES

The students
- Observe rain as it falls on different surfaces.
- Observe accumulating surface water.
- Trace the flow of water.

BACKGROUND

This activity is designed as a discovery lesson to be done in a relatively warm rain. Students should make raincoats as done in kindergarten as preparation for the rain.

STUDENT ROLES

Hydrologist
Observer

MATERIALS

plastic bags
plastic tape
scissors
string for belts
Student Page 1.2.2 RAIN

PRODUCTS

Raincoats
Completed Student Pages

PROCEDURES

1. **Prepare for the study by having students make raincoats.**

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2. **Assign rain observation groups.**

   Assign each group to follow what happens to rain as it continues to fall on different surfaces (roofs, sidewalks, driveways, gardens, grass, etc.).

   Have students
   - Trace water as far as they can after it has fallen.
   - Observe where water tries to go.
   - Try to figure out why water goes where it goes.

3. **When the rain comes, begin with a directed observation with the entire class.**

   Have students
   - Taste rain as it falls on their faces.
   - Observe what happens to the first raindrops that hit the sidewalk.
   - Observe what happens to the first rain that hits bare soil.
   - Observe what happens to the first rain that hits a roof.
   - Observe what happens to the first rain that hits grass.
   - Observe what happens to the first rain that hits trees.
   - Observe what happens to later rain that hits each of these same surfaces.

4. **Have assigned groups make their observations.**

   Have them record their observations on Student Page 1.2.2 RAIN.

5. **Discuss student observations.**

   Some suggested questions are
   - What happened to the first drops of rain to fall on various surfaces?
   - About how long did it seem to take before the raindrops acted differently?

- How did the way raindrops behave change?
- Where did the water go?
- What seemed to stop the water?
- What seemed to let the water go on?
- Where was the water going when you last saw it?

EXTENSIONS

- Have students regularly report on other observations that they make about rain and surface water.
- Students can simulate rainwater falling on different kinds of surfaces in the classroom by using an eyedropper and verifying their outdoor observations.

1.2.3 SNOW AND STREAMS

OBJECTIVES

The students
- Observe snow as it falls on different surfaces.
- Observe accumulating melted-snow water.
- Trace the flow of melted-snow water.

BACKGROUND

This activity is designed as a discovery lesson to be done during the first snow when melting and runoff are highly probable. In preparing for this activity go over the rules for dressing warmly.

STUDENT ROLES

Hydrologist
Observer

MATERIALS

snow clothes
Student Page 1.2.3 SNOW

PRODUCT

Completed Student Pages

PROCEDURES

1. **Prepare for the study by discussing with the students rules for dressing warmly. Assign groups to follow what happens to snow as it continues to fall on different surfaces.**

   Include such surfaces as sidewalks, trees, grass, open ground, roofs, roadways, and metal playground equipment.

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2. **When an accumulating snow comes, have students go outside and make their observations.**

   Start with a class-directed observation.

   Have students
   - Taste snow as it falls on their faces.
   - Observe what happen to the first snowflakes that hit the sidewalk.
   - Observe what happens to the first snow that hits bare soil.
   - Observe what happens to the first snow that hits a roof.
   - Observe what happens to the first snow that hits grass.
   - Observe what happens to the first snow that hits trees.
   - Observe what happens to later snow that lands on each of these same surfaces.

3. **Carry out group assignments.**

   Record observations on Student Page 1.2.3 SNOW.

4. **Discuss student observations.**

   Some suggested questions are
   - What happened to the first snowflakes to fall on each surface?
   - About how long did it seem to take before the snowflakes began to build up?
   - How does snow act the same and differently on the surfaces studied?

5. **When the snow starts to melt, have students go outside to study the runoff.**

   - Follow where the water that builds up on surfaces goes.
   - Investigate the purpose of gutters, storm drains, and streams.
   - Investigate how water is routed by barriers, small dams, depressions, small ditches, etc.
   - Investigate the direction water takes on hills. Does it go uphill, downhill or both?

- Trace the melting-snow water as far as possible.
- Observe where it tends to go.
- Try to figure out why it goes where it goes.

6. **Discuss student findings.**

Suggested questions are

- Where did the melting start?
- Where did the water from the melted snow go?
- Where was the water from the melted snow going when you last saw it?

EXTENSION

- Have students regularly report on other observations that they make about snow and surface water.

1.2.4 THE DIGITAL CLOCK

OBJECTIVES

The students
- Read digital time.
- Use digital time in organizing daily classroom activities.
- Record digital time.

BACKGROUND

This activity begins the formal study of short-interval time. The next activity, 1.2.5 HOURS AND MINUTES, introduces the hour and the minute. Digital time is used in first grade because of its simplicity. An understanding of digital time is necessary to understanding sunrise and sunset which is introduced in Activity 1.2.7 SUNRISE AND SUNSET.

Introduce the digital clock through use. To be fully successful, students should recognize the numbers 0–50. However, do not hold up the class because a small group of students have not mastered the recognition of these numbers. Reading the digital clock will provide a practical opportunity to use and learn the numbers. Through cooperative activities, most students will quickly learn to read the digital clock. This will leave time for teacher interaction with students who need special attention.

After the introduction to reading the digital clock is underway, further practice and recording of digital time is done in a game environment.

STUDENT ROLE

Chronologer

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MATERIALS

clock numbers
5 X 8 cards
scissors
staplers
chart paper
markers

Student Pages	1.2.4A-D	DIGITAL CLOCK NUMBERS
	1.2.4E	DIGITAL CLOCK GAME

PRODUCTS

Class chart today's schedule
Cardboard digital clock

PROCEDURES

1. **Introduce digital time by making the class chart today's schedule.**

   - Place a large digital clock in the front of the room.

   - Start this activity by writing a schedule of events on a piece of chart paper or on the board.
     Example:
     ✔ First we will have math, then recess, etc. Note times that must be strictly adhered to such as scheduled music times, lunch, etc.

   - Follow the schedule, having students record what the time is when they start the next activity.
     Example:
     ✔ It is now 9:05. We will start reading. It is now 10:15. We will have our snack.

   - After a few days, announce that we need some clock watchers. Ask for a group to volunteer to tell the class what the time is at the next change in schedule. Rely on peer teaching to instruct students needing further help.

2. **Have the students construct their digital clocks.**

- Cut out numbers.
- Sort the numbers into 3 piles:
  hours: 1-12
  ✔ Student Pages 1.2.4A-B

  minutes: 0-5, tens place
  ✔ Student Page 1.2.4C

  minutes: 0-9, ones or units place
  ✔ Student Pages 1.2.4C-D
- Staple to 5 X 8 cards.
- Demonstrate how the clock works.

3. **Introduce and play the digital clock game with student groups of three.**

Explain the game rules to the students.

- Student #1 sets a time on the student clock.
- Student #2 records the time on Student Page 1.2.4E DIGITAL CLOCK GAME and reads the time aloud.
- Student #3 indicates whether the writing and reading are correct.
- Student #1 verifies the response of Student #3.
- Students shift roles, #1 becomes #2, etc.

The teacher or a group of student time experts judge contested readings.

4. **Investigate digital time with the students.**

Ask such questions as these:

- What is the biggest number you can set your clock for?
- Does our clock ever show that number?
- What time would that be?

- When during the day do you think our class clock would show that time?
  ✔ Set up observation.
- When else might it show that time?
- What is the smallest number you can set your clock for?
- Does your clock ever show that number?
- What time would that be?
- When during the day do you think our class clock would show that time?
  ✔ Set up observation.

EXTENSION

- The digital clock game can be put into an activity center.

1.2.5 HOURS AND MINUTES

OBJECTIVES

The students
- Locate the hour position on a digital clock.
- Locate the minute position on a digital clock.
- Read the number of minutes after the hour.
- Practice reading digital time.

BACKGROUND

After students gain proficiency in reading and recording the time, a simulated inquiry is used to further develop the idea of the hour and the minute. Students should already have some understanding of hours and minutes from Activity 1.2.4 THE DIGITAL CLOCK. Use students' cardboard digital clocks.

STUDENT ROLE

Chronologer

MATERIALS

cardboard digital clocks from Activity 1.2.4 THE DIGITAL CLOCK
Student Page 1.2.5 HOURS AND MINUTES

PRODUCT

Completed Student Pages

PROCEDURES

1. **Have students working in small groups read and discuss digital clock settings.**

   Ask such questions as these:
   - On our cardboard digital clock, which numbers tell us what the hour is?

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- Can you set your clock so that it reads 12:00?

- Why do we put 00 after the 12?
  ✔ Get at the idea of no minutes.

- What is the time now shown on the clock?
  ✔ Work with 1:00, 2:00, 3:00, etc.

- On your cardboard digital clock, where are the minutes shown?

- How many hours and how many minutes are shown on the clock?
  ✔ Example: 7:15 means 7 hours and 15 minutes.
  Work through a sequential series of 15-minute intervals.
  Follow this with a random set of numbers.

2. **Have students again play the digital clock game described in Activity 1.2.4. THE DIGITAL CLOCK, this time reading the number of hours and minutes.**

3. **Have students begin to interpret digital time.**

Some suggested questions are

- Why is 12:00 such an important time?

- What do we mean when we say it is 1:00?
  ✔ Get at the idea that it is 1 hour after the hour of 12:00.

- What do we mean by the following times?
  ✔ Set the clock at 2:00, 3:00, 4:00, etc.

- What do we mean when we set the clock at 1:01?
  ✔ Get at the idea that it is 1 hour and 1 minute after the hour of 12:00. We shorten this and say one minute after one.

- What do we mean by the following times?
  ✔ Set the clock in a sequence using 15-minute intervals, then use random settings.

  Example: 3:15. Answer: 15 minutes after 3.

4. **Have student groups of three play the digital clock game with the addition of the question, "How do we read the time in hours and minutes after the hour?"**

   Use Student Page 1.2.5 HOURS AND MINUTES.

1.2.6 TIME LINE

OBJECTIVES

The students
- Observe that there are 24 hours in a day.
- Observe that there are 60 minutes in an hour.
- Create a 24-hour time line.
- Identify AM and PM on their time line.

BACKGROUND

This is the third activity on digital time. Students move from the familiar wristwatch or clock time to a linear model (a time line) that parallels the Learning Calendar. The time line provides a tool to think of how the minute and hours of the day follow each other.

Each student makes a 24-hour digital time line. This is used to determine the interval between events such as sunrise and sunset, school opening and closing, etc. For example, to find the interval between going to sleep and waking up, the hours and minutes may be counted or measured. To measure use three time lines. Put two time lines end to end. Mark the times of going to sleep and waking-up. Put the third time line next to the other two with midnight at the going-to-sleep time. Use this third time line as a number line and read the number of hours and minutes slept directly from the third time line at the waking-up time.

If several intervals of time are to be added (as in time spent eating), begin the second interval (lunch) at the ending point of the first interval (breakfast) on the third time line. Continue until all intervals are added together. This is a beginning addition slide rule.

STUDENT ROLE

Chronologer

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MATERIALS

student digital clocks from Activity 1.2.4 THE DIGITAL CLOCK
scissors
glue

Student Page	1.2.6A	TIME LINE (one copy per student)
	1.2.6B	TIME LINE (3 copies per student)
	1.2.6C	WHAT TIME IS IT? (one copy per student)
	1.2.6D-H	HOURS AND MINUTES (one copy per student)

PRODUCTS

A 24-hour digital time line
Completed Student Pages

PROCEDURES

1. **Review and discuss the digital time with the class.**

   Ask such questions as these:
   - What was the first hour of today?
   - When did that hour occur?
   - What will be the last hour of today?
   - When will that hour occur?
     ✔ Students might set an alarm clock at home to test their answer. If students are to do this, break the inquiry here and wait until they have had time to make their observations.
   - Can you set your digital clock to show the largest possible number of minutes after the hour of 12:00?
   - How many minutes did you find?
   - What is the largest possible number of minutes after 1:00, 2:00, any hour?

2. **Introduce the time line to the class.**

   State that we need to have a way of seeing time for the whole day. Show students a 12-hour time line.

- Have a student number the time line at one-hour intervals from 12:00 to 12:00.

- Ask whether anyone knows another name for 12:00.

- Identify one 12:00 as midnight and one as noon.

3. **Help students discover a full-day time line.**

Ask such questions as these:
- How many hours are in one full day?

- Does this time line represent a full day?
  ✔ 24 hours?

- What would we have to do to make it a full-day time line?

- Can you make a full-day time line?
  ✔ Have students invent a way; assist only as needed.

- What does the time line look like?
  ✔ Correct errors in the sharing process.

- Can you number the hours on this time line?

4. **Have students construct their own digital time lines.**

Each student will need 1 copy of Student Page 1.2.6A TIME LINE and 3 copies of Student Page 1.2.6B TIME LINE.

Have students
- Cut out all 8 time line pieces.

- Put glue on the word "glue."

- Put strips together. The first strip has a space for the student's name.

- Have students label their 24-hour time lines from 12:00 midnight to 12:00 midnight.

5. **Introduce the minute position.**

Ask such questions as these:
- What is the number of minute spaces between 12:00 and 1:00 on the time line?

✔ If students are careful, they will count 60 spaces.

- What is the largest number of minutes your digital clock will show between hours?
  ✔ Between 12:00 and 1:00, students will show 59.

- There is one that you did not count. Can anyone find it?
  ✔ If necessary, show that it is the minute that ends at 1:00. This will be a difficult concept for many students to intellectualize at this point. Do not be concerned. The idea will come up many times. The major point is that there are 60 minutes in an hour.

- How many minutes are there in an hour?

- Can you number the minutes on your time lines by tens from 12:00 to 1:00?
  ✔ 10, 20, 30, 40, 50.

- What does your time line look like now?

- Where is the 60th minute?

- How many minutes in a half hour?

- Can you mark the thirty-minute points on the rest of your time line?

- What does your time line look like now?

6. Introduce AM and PM

Ask such questions as these:

- Where is the morning side of our time line?

- Does anyone know what else people call the morning hours?
  ✔ Give the term "AM," meaning ante meridian or before noon.

- Can you run an apricot line along the AM part of your time line?

- Where is the afternoon and evening side of your time line?

- Does anyone know what else people call the afternoon and evening hours?
  ✔ Give the term "PM," meaning post meridian or afternoon.

- Can you run a purple line along the afternoon and evening side?

7. **Have students use Student Page 1.2.6C WHAT TIME IS IT? to keep track of a school day.**

    - Have students draw (and label) pictures and/or keep a similar record on chart paper to assist with spelling as needed.
    - Cut the worksheet into strips and have students use paper clips to attach each activity at the appropriate time on their time lines.
    - Have student teams check each other.

8. **Have students complete Student Pages 1.2.6D–H HOURS AND MINUTES to keep track of a 24 hour day. Students will need to take these pages home to complete them.**

9. **Have student groups invent a way to determine the hours and minutes between events using their time lines.**

    Some suggested questions are
    - How could you use your time lines to show the number of hours and minutes you slept last night?
    - How long were you in school yesterday?
    - How much time did you spend eating yesterday?

1.2.7 SUNRISE AND SUNSET

OBJECTIVES

The students
- Record the time of sunrise and sunset each day.
- Observe the effects of the sun on the earth through the seasons.
- Use digital time.
- Practice finding east and west directions.
- Define sunrise, sunset, and horizon.

BACKGROUND

In this activity students collect data on the time of sunrise and sunset. Collection should start shortly before the Fall Equinox (September 23). This allows students to predict the occurrence of the equinox in the fall of second grade.

Ideally, each child will have a digital watch. Otherwise, students can use home clocks or can get telephone information on the time of sunrise and sunset. Newspapers and some calendars have this information also. Inform parents of the need for assistance.

There will be variations in students' data for several reasons, including different horizons (some students may live in valleys, in cities, on hilltops, on plains), different clock settings (practice clock synchronization using radio and telephone time services), and other errors of all sorts! Students who live on plains, hills, or mountain tops, and in high buildings will probably have readings that correspond most closely to newspaper and radio reports of sunrise and sunset. Have students observe that differences between readings will be the same each day if their watches and clocks are synchronized. For example, a person living in a valley will see the sunrise 5 to 30 minutes after a student living on the top of a mountain sees it.

There will be similar variations in sunset data. A student in the valley will see the sunset 5 to 30 minutes before the student on the mountain top sees it.

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After students have had firsthand experience collecting data, someone will probably discover that the data on sunrise and sunset are given in newspapers and over radio and on TV. These data are verified and recorded daily on the Learning Calendar.

STUDENT ROLES

Log keeper
Astronomer

MATERIALS

Working Dictionary
The Learning Calendar
colored Markers
The Responsibility Chart
time lines from Activity 1.2.6 TIME LINE
Student Page 1.2.7 SUNRISE AND SUNSET

PRODUCTS

Sunrise and sunset data on the Learning Calendar
Working definitions of sunrise, sunset, and horizon
Completed Student Pages

PROCEDURES

1. **Introduce the activity and have students create working definitions of sunrise and horizon.**

   Ask such questions as these:
   - How can we find out what time the sun will rise tomorrow?
   - What do we mean by sunrise?
     ✔ Work for a definition of sunrise as the time when the sun first shows on the horizon.
   - What do we mean by horizon?
     ✔ Work for a definition of horizon as the distant line we see between earth and sky.

   Record working definitions in the Working Dictionary.

2. **Have students collect sunrise data for several days.**

   - Agree upon how students will find the time of sunrise.
   - Record the digital time of sunrise on Student Page 1.2.7 SUNRISE AND SUNSET.

3. **Have student groups share and discuss their sunrise data. Report findings to the class.**

   - Record data on the time lines made in Activity 1.2.6 TIME LINE.
   - Compare their data.
   - Note that differences in students' reported times are about the same each day.
   - Report where they live.
   - Work toward a class generalization that people in valleys see the sunrise later than other people.

4. **Have students begin the collection of sunset data using the same procedures as done for sunrise.**

   - Work toward a class generalization that people in valleys see the sunset earlier than other people.
   - Have students try to find out where they can get daily reports on sunrise and sunset.
   - Add collection and recording of sunrise and sunset data on the Learning Calendar to the Responsibility Chart.
   - Have students create a working definition of sunset and record it in their Working Dictionary.

1.2.8 NIGHT AND DAY

OBJECTIVES

The students
- Collect data about sunlight and seasonal change.
- Observe that the length of one day-and-night cycle is about 24 hours.
- Correlate changing length of day with seasonal changes.
- Correlate day and night length with solstices and equinoxes.
- Practice using digital time.

BACKGROUND

This year-long activity should be started about 2 weeks after sunrise and sunset data collection becomes routine. Students convert the data from Activity 1.2.7 SUNRISE AND SUNSET into linear representations of time with string or tape. The string or tape can be colored with marking pens, crayons, or even chalk.

During the year a series of correlations are made as students work toward an understanding of seasons.

STUDENT ROLE

Astronomer

MATERIALS

class chart day and night
tape or string
yellow and black crayons, markers, or chalk
stapler
time line from Activity 1.2.6 TIME LINE
scissors
glue
Student Pages 1.2.8A CLASS TIME LINE
1.2.8B DAY AND NIGHT IN SUMMER

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PRODUCTS

Class chart day and night
Class time line
Completed Student Pages

PROCEDURES

1. **Establish the need for the class chart day and night.**

   Have the students construct a month-by-month time line for the chart using Student Page 1.2.8 CLASS TIME LINE.

   Ask such questions as these:
   - What seems to have happened to the length of the day since we have started keeping records?

   - How can we tell?

2. **Demonstrate using the digital time line from Activity 1.2.6 TIME LINE to represent the daylight hours between sunrise and sunset. See Figure 1.2.8.**

   - Cut a piece of tape or string as long as the 24-hour time line.

   - Place the tape along side the time line.

   - Mark the times of sunrise and sunset on the tape.

   - Color the tape yellow between sunrise and sunset.
     ✔ Day.

   - Color the remainder of the tape black.
     ✔ Night.

   - Attach the tape to the chart under the appropriate date on the class time line.

   Have each group make one or more representations of daylight length for previously collected sunrise and sunset data.

   A new tape should be added to the class chart at least once each week.

3. **Discuss correlation 1, days get shorter and nights get longer in fall.**

   Explore the length of night and day after a month.

   Ask such questions as these:
   - How long is the night?
   - How long is the day?
   - What is happening to the length of the day and night?

4. **Discuss correlation 2, the length of day plus the length of night are equal to about 24 hours.**

   Ask such questions as these:
   - How long a time is it from sunrise to sunrise?
   - How can we find out?
     ✔ There are several ways: (a) Measure directly on the time line. Put 2 time lines together using one as a time ruler. (b) Put night and day tapes end to end and measure on the time line. (c) Calculate.

5. **Discuss correlation 3, the lengths of day and night are the same on September 23, the first day of fall.**

   - Around the middle of September have students find out the date of the first day of fall.
   - Have students predict what might happen to the length of day and night on that date.
   - After the date have students make correlations between the equinox and the first day of fall.

6. **Have students record their predictions about what will happen next to the length of day and night on the Learning Calendar.**

   - Watch to see whether their predictions are correct.
   - Have students continue to make predictions after each discussion.

7. **Discuss correlation 4, December 22, the first day of winter, has the longest night and the shortest day.**

   - Two weeks before Christmas vacation, ask students to find out when the first day of winter will be.
     ✔ Suggest that they may use the radio, TV, newspaper, their parents, etc., as information sources.
   - Continue sunrise and sunset data collection over the vacation.
   - On return from vacation, correlate day and night length with the first day of winter.

8. **Discuss correlation 5, days get longer and nights shorter as the winter progresses.**

   Begin any time after the students return from Christmas vacation.

   Ask such questions as these:
   - What seems to be happening to the length of the day?
   - When did this seem to start?
   - How long do you think this will go on?

9. **Discuss correlation 6, the lengths of day and night are the same on March 21, the first day of spring.**

   - Around the beginning of March ask students to find out when the first day of spring will be.
   - Ask students to predict what will happen to the length of day and night on that day.
   - After the event make correlations between the equinox and the first day of spring.

10. **Discuss correlation 7, days continue to get longer and the nights shorter in the Spring.**

    A week or so after the Spring Equinox ask such questions as these:
    - What is happening to the length of the day?
    - How long do you think this will go on?

- Can you predict when there might be a change?

11. **Right before summer vacation, challenge students to find out if and when the days start to get shorter again over the summer.**

    Use Student Page 1.2.8B DAY AND NIGHT IN SUMMER to record data.

EXTENSIONS

- Have students make a day-and-night graph for shorter time intervals. Have them graph data every day or every other day.
- Have students record the total time from sunrise to sunrise on the Learning Calendar. Students may notice the times are a bit longer than 24 hours for some seasons and shorter for others.

ILLUSTRATION

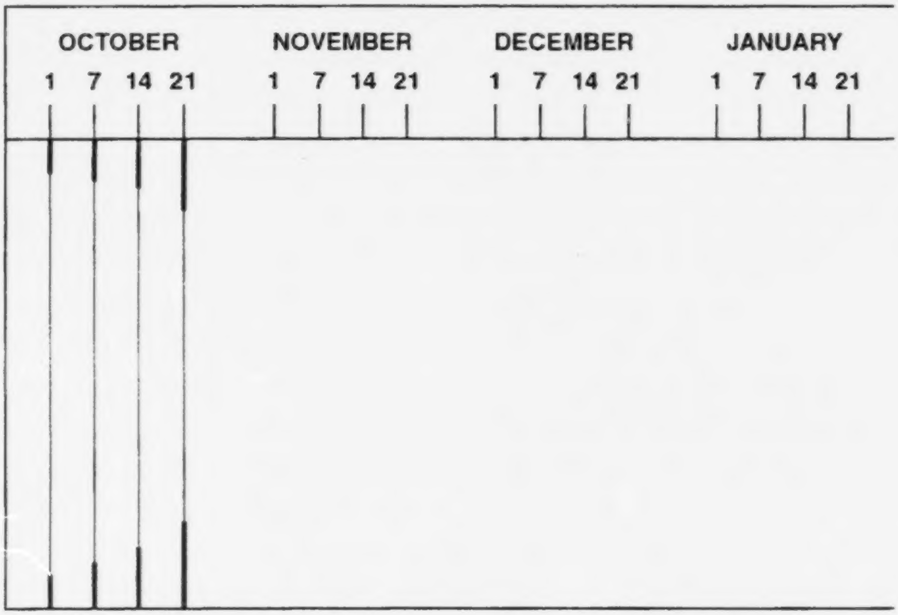

FIGURE 1.2.8 Night and Day

1.2.9 THE SUN

OBJECTIVES

The students
- Relate the warmth of the day to the light from the sun.
- Observe that shadowy places are cooler than places in the sun.
- Observe that it is warmest during the middle of the day.
- Observe temperature is related to the sun's position in the sky.
- Observe that cloudy days tend to be cooler than sunny days in the same time of year.
- Observe that the day cools off in the afternoon.

BACKGROUND

Students record daily temperature on the Learning Calendar as they did in kindergarten. In this activity students observe the relationship between the sun and temperature.

This is an open-ended activity. Investigations are designed by the students and carried out over the course of the year. Each new kind of temperature measurement has some group assigned to it. Data are recorded on class charts.

STUDENT ROLE

Meteorologist

MATERIALS

8–10 thermometers –10° to 110°C
chart paper
markers
Student Page 1.2.9 THE SUN

PRODUCTS

Class chart temperatures
Completed Student Pages

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PROCEDURES

1. Have students go outside to feel the morning sun.

Warn students not to look directly at the sun.

Ask such questions as these:
- When you face the sun, do you feel anything special?
- When you face away from the sun, do you feel different from when you face it? What do you think makes the difference?
- How could you test this difference?
  ✔ Group 1.
- What do you think happens to the temperature outdoors over the day?
- How could you test this?
  ✔ Group 2.
- Can you tell the approximate time of day by the temperature? If so, how?
  ✔ Group 3.
- What questions would be interesting to ask about temperature during the day?
- How can you find answers?
  ✔ Groups 4-n.

2. Have students "feel" cloud and shadow.

On a day that starts out sunny and ends up cloud-covered, have students look at the question of temperature again.

Ask such questions as these:
- Does it seem to be cooler now than when it was sunny?
- How can this be?
- Can we make temperature predictions about cloudy days and sunny days?
- How can we test our predictions?
  ✔ Assign a group.

3. **Have students "feel" fall. In late November have students look at their temperature data.**

   Ask such questions as these:
   - How does the temperature this week compare with the temperature the week we came back to school?
   - Does it seem to be getting warmer, cooler, staying about the same?
   - How can this be?
   - How can we test our ideas?
     ✔ Assign a group.

4. **Have students "feel" winter. Right after Christmas vacation (near the shortest day of the year, December 22) have students again look at temperature data.**

   Help students correlate their data on the length of day and night with their data on temperature.
   ✔ Work for a hypothesis concerning temperature and sunlight, if none came out of the November observations.

5. **Have students "feel" spring. Return to the correlation of sunlight and temperature in the spring sometime in April.**

   Verify students' hypotheses.

EXTENSION

- Assign night temperature investigations as home projects.

1.2.10 THE SEASONS

OBJECTIVES

The students
- Relate changing day length to seasons.
- Relate changes in temperature to seasons.
- Relate precipitation to seasons.
- Relate human activity to seasons.
- Relate environmental changes to seasons.

BACKGROUND

Several sources are used to describe the seasons. Some information comes out of the Learning Calendar data on weather and temperature. Length of night and day is found on the day and night chart from Activity 1.2.8 NIGHT AND DAY. Observations of the condition of plants and animals is collected from visits to the Outdoor Study Area (OSA). General information will come from home, TV, radio, newspapers, and other sources.

In a particular year characterizing seasons may prove difficult because seasons involve trends. Individual years may be very different as to when rain, snow, shedding of deciduous leaves, bursting of new buds, plowing, planting, etc., occur. For this reason, a collection of calendars and access to kindergarten Learning Calendars help to establish seasonal trends. The student will be aided by stereotypic language from TV commercials, parental language, and holidays.

This activity should be started about mid-September. It begins with the observation that summer has not yet passed when school begins. The teacher asks students to find out when the first official day of fall occurs. This assignment is repeated for each of the beginning days of the seasons in Activity 1.2.8 NIGHT AND DAY.

- Fall—begins September 23 at the Fall Equinox, equal day and night.
- Winter—December 22 the Winter Solstice, shortest day, longest night.
- Spring—March 21 the Vernal Equinox, equal day and night

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- Summer—June 21 the Summer Solstice, longest day, shortest night.

Information on these dates can be found by students in talking to parents, looking at calendars, listening to TV and radio, etc.

STUDENT ROLE

Scientist

MATERIALS

The Learning Calendar
observations of OSA
chart paper
Working Dictionary
markers
3 X 5 Cards
Student Page 1.2.10 SEASONS

PRODUCTS

Concept map seasons
Class chart seasons
Working definitions of fall, winter, spring, summer, and season
Completed Student Pages

PROCEDURES

1. **Introduce the concept of seasons and have students begin the class chart seasons.**

   Some suggested questions are
   - What season are we in?
     ✓ This can be verified as a take-home question.
     At this point do not discuss the meaning of seasons as this will emerge from the activity.

   - What do you think the next season will be?

   - When does the next season start? Have students talk to people and listen to TV and radio to find out when fall will start. Record dates on class chart seasons as students get information.

- What do you think will happen in the fall? How is fall different from summer?

List predictions on the chart and check off the ones that turn out to be right.

2. **Record observations on class chart seasons and Student Page 1.2.10 SEASONS. Have students discuss fall and predict winter.**

Ask such questions as these:

- What things have we recorded on our chart that tell us about fall?
- Which holidays are in the fall?
- What do we mean by fall?
- What do you think the next season will be?
- When will the next season start?
- What do you think will happen in the winter that is different from the fall?

List predictions on the class chart seasons as before.

3. **Repeat Procedure 2 in late February for spring.**

4. **Repeat Procedure 2 in late May for summer.**

Summer data will be collected over the vacation period and generally will be far less systematic than that collected during the year. However, students will have an over-summer focus to begin grade 2. Use Student Page 1.2.10 SEASONS to record student summer observations.

5. **Have students create a pictorial concept map for seasons.**

- Write the word "seasons" in the middle of a large piece of chart paper.
- Write the words "fall," "winter," "spring," and "summer" on the chart and connect them to the word "seasons."
- Have students draw and label seasonal pictures on 3 x 5 cards. The teacher may have to help with labeling.

- Build a connecting web on the chart paper using student pictures and ideas.

6. **Have students develop working definitions of fall, winter, spring, summer, and seasons. Record in the Working Dictionary.**

1.2.11 MAKING A CLOCK

OBJECTIVES

The students
- Observe that time can be measured in many different ways.
- Invent a clock.
- Observe that time measurement is based on countable or measurable equal-interval events.

BACKGROUND

This is a project activity. It can be done in small groups or individually. It can be a school or home project.

If done in groups, have each group decide what materials they will need and where they will get them. Play the role of director of a clockworks, checking plans and helping students get what they need.

STUDENT ROLE

Clockmaker

MATERIALS

Student-collected materials (jars, candles, funnels, etc.)
Student Page 1.2.11 CLOCKS

PRODUCTS

A functioning clock
Completed Student Page

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PROCEDURES

1. **Introduce the "breathing" clock.**

   Announce "I'm a clock. I can tell time by my breathing."

   Ask such questions as these:
   - Can you tell time from your breathing?
   - Can you tell how long a minute is? Have students explain how they would measure a minute by breathing. Have them test their ideas.
   - How did you tell time from your breathing?
   - Did we all breathe the same number of times in a minute?

2. **Introduce the "walking" clock.**
   "I can tell time by listening when I walk, can you?"

   Ask such questions as these:
   - Can you tell how long a minute is by walking? Have students explain how they would measure a minute while walking. Have them test their ideas.
   - How did you tell time from your walking?
   - Did everyone take the same number of steps in one minute?
   - Can anyone think of any other way we might tell time? Explore any suggestions.

3. **Introduce the clock project with the announcement that we need to make some clocks to help keep track of time.**

   Have students work in groups to plan their clock.

   Have them
   - Decide what kind of clock they are going to make.
   - Decide what materials they need.
   - Decide how they are going to get the materials they need.
   - Use Student Page 1.2.11 CLOCKS to record their clock plans.

- Tell you about their plan and what they need.
- Build their clocks.

4. **Hold a clock day.**

   Have students demonstrate their clocks and tell how they work.

DASH 1.2.12 MOONRISE AND MOONSET

OBJECTIVES

The students
- Observe the moon rising in the east.
- Observe the moon setting in the west.
- Learn a mnemonic about moonrise and moonset.
- Develop a sense of using the moon to identify compass directions.
- Observe and record times of moonrise and moonset.
- Observe that the moon appears to wax and wane.
- Use newspaper, internet, or almanac information to record moonrises and moonsets on the class calendar.

BACKGROUND

In this activity students observe and note the compass direction of where the moon appears to rise and set. If students are new to DASH you may need to review the moon phases. See Kindergarten DASH Activities K.2.6 MOON WATCH and K.2.7 MOON PHASES.

Introduce this activity after the students are well practiced in recording and graphing the time of sunrise and sunset. See ACTIVITY 1.2.8 SUNRISE AND SUNSET. After observing the moon, the students can get data each day from newspapers, the internet, tide or fishing calendars, or almanacs to record moonrise and moonset on the Learning Calendar.

The purpose of this activity is to observe the moon cycle, noting the regularity of the phases and to observe that the moon waxes or grows as it moves from new moon phase to full moon and wanes or shrinks as it goes from full moon to new moon. It is sufficient in DASH 1 if students begin to realize that the moon appears to rise in the east and set in the west, and that it rises later day by day. In DASH 2 the recurring pattern of moonrises and moonsets will be observed when the students graph this data. Explanation of how the moon cycle operates doesn't occur until DASH 4 after four years of observation.

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STUDENT ROLES

Astronomer
Mathematician

MATERIALS

Learning Calendar
newspaper, the internet, calendar, or almanac data on moonrise and moonset
Wonder and Discover Book
Working Dictionary
Student Page 1.2.12 MOONRISE AND MOONSET

PRODUCTS

Concept map about the moon
Learning Calendar data
Working Definition of moon cycle
Completed Student Pages

PROCEDURES

1. **Set the stage for moon study by making a concept maps about what the students know about the moon and its cycle.**

   Include such questions as these:
   - What are the moon's phases?
   - In what sequence do the moon phases take place?
   - What seems to happen to the moon as it moves through its phases?
     ✔ Work for the idea that it seems to change its size—to grow and shrink.
     ✔ Introduce the terms *waxing* and *waning*.
   - About how long does one moon cycle take?
   - How might you find out where the moon rises? The moon sets?
   - What questions do you have about the moon and its cycle?

2. **Have the students observe the moon through one or more cycles recording on the Learning Calendar the phase and whether it is waxing or waning. Then return to the concept map about the moon and add or revise information.**

3. **Have the students observe the moon rise during school time.**

   Include such questions as these:
   - Where did you look to find the rising moon?
   - If you were looking for the next moon to rise, what part of the moon might you see first?
   - What phase was the moon in when you saw it rising?
   - When do you think the moon will rise tomorrow? How could you find out?

4. **Have the students observe the moon set during school time. Use Student Page 1.2.12 at home to verify the directions of moonrise and moonset.**

   Include such questions as these:
   - Where did you look to find the setting moon?
   - If you were looking for the next moon to set, what part of the moon might you see last?
   - What phase was the moon in when you saw it setting?
   - When do you think the moon will set tomorrow? How could you find out?
     ✔ Work for the idea of looking for the time in the newspaper or other data source.
     ✔ Add the recording of moonrise and moonset to the Learning Calendar and Responsibility Chart.
   - Does the moon rise at the same time as the sun? Set at the same time?
     ✔ This is a question for the Wonder and Discover Book.
   - Is the moon in the sky as long as the sun is in the sky?
     ✔ This is another question for the Wonder and Discover Book.
   - Do you have any other questions about the moon and its phases?

5. **Introduce a new verse to the Body Compass Song that uses the moon to find direction. Add *moonrise* and *moonset* to the compass directions posted in the classroom. See Activity 1.7.2 NORTH, SOUTH, EAST, AND WEST.**

   Sing to the tune of *Johnny Comes Marching Home*
   The moon is rising in the east, the east, the east.
   The moon is setting in the west, the west, the west.
   My nose is north.
   My seat is south.
   The earth can turn itself about.
   The moon is rising in the east
   And setting in the west.

6. **Have the students summarize their moon study by returning to the class concept map about the moon to record new information and revise as necessary and by creating or revising their Working Definition of the moon cycle. Record any remaining questions in the Wonder and Discover Book for investigation in DASH 3.**

EXTENSION

- Have the students make timelines for two or more moon cycles on adding machine tape recording the date, the moon phase including waxing or waning, and the time for moonrise and moon set. Have them lay the timelines out, one above the other, and look for similarities and differences.

DASH

WEATHER WORDS 1.2.1A

Name: ____________________

Date: ____________________

DASH

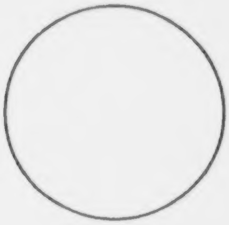
MOON MATCH-UP 1.2.1B

Name: ____________________

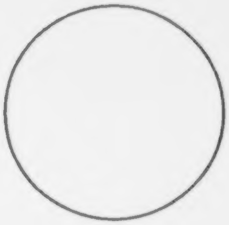
Date: ____________________

Color each of the moon phases.

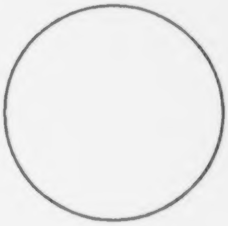
New



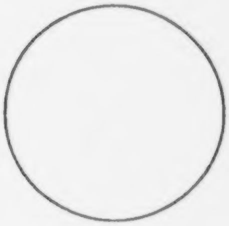
Crescent



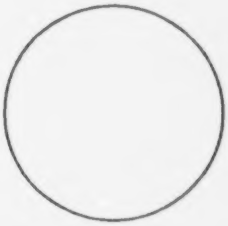
Quarter



Gibbous



Full



DASH

RAIN
1.2.2

Name: ______________________

Date: ______________________

Surface: --

Write about or draw your observations.

DASH

SNOW
1.2.3

Name: ____________________

Date: ____________________

Surface: -

Write about or draw your observations.

DASH

DIGITAL CLOCK NUMBERS 1.2.4A

Name: ______________________

Date: ______________________

1:	2:	3:
4:	5:	6:
7:	8:	9:

DASH

DIGITAL CLOCK NUMBERS 1.2.4B

Name: ______________________

Date: ______________________

10:	**11:**	**12:**

DASH

DIGITAL CLOCK NUMBERS
1.2.4C

Name: ______________________

Date: ______________________

1	2	3
4	5	0
0		

DASH

DIGITAL CLOCK NUMBERS
1.2.4D

Name: ____________________

Date: ____________________

1	2	3
4	5	6
7	8	9

DASH

DIGITAL CLOCK GAME 1.2.4E

Name: ______________________________

Date: ______________________________

NAME	TIME	CORRECT?	
		YES	TRY AGAIN

DASH

HOURS AND MINUTES 1.2.5

Name: ______________________

Date: ______________________

NAME	TIME	What does this time mean?	
		YES	TRY AGAIN

SP 1.2.6A

DASH

TIME LINE
1.2.6A

Name: ______________________

Date: ______________________

NAME:

GLUE

DASH

TIME LINE
1.2.6B

Name: ______________________

Date: ______________________

GLUE

GLUE

WHAT TIME IS IT? 1.2.6C

Name: ____________________

Date: ____________________

What time is it?	What am I doing?

SP 1.2.6D

DASH

HOURS AND MINUTES
1.2.6D

Name: ____________________

Date: ____________________

What time is it?	What am I doing?
8:00 am	
8:30 am	
9:00 am	
9:30 am	
10:00 am	
10:30 am	
11:00 am	
11:30 am	
12:00 noon	
12:30 pm	

DASH

HOURS AND MINUTES 1.2.6E

Name: ____________________

Date: ____________________

What time is it?	What am I doing?
1:00 pm	
1:30 pm	
2:00 pm	
2:30 pm	
3:00 pm	
3:30 pm	
4:00 pm	
4:30 pm	
5:00 pm	
5:30 pm	

HOURS AND MINUTES 1.2.6F

Name: ______________________

Date: ______________________

What time is it?	What am I doing?
6:00 pm	
6:30 pm	
7:00 pm	
7:30 pm	
8:00 pm	
8:30 pm	
9:00 pm	
9:30 pm	
10:00 pm	
10:30 pm	

SP 1.2.6G

DASH

HOURS AND MINUTES
1.2.6G

Name: ______________________

Date: ______________________

What time is it?	What am I doing?
11:00 pm	
11:30 pm	
12:00 am	
12:30 am	
1:00 am	
1:30 am	
2:00 am	
2:30 am	
3:00 am	
3:30 am	

DASH

HOURS AND MINUTES 1.2.6H

Name: ______________________

Date: ______________________

What time is it?	What am I doing?
4:00 am	
4:30 am	
5:00 am	
5:30 am	
6:00 am	
6:30 am	
7:00 am	
7:30 am	
8:00 am	

DASH

SUNRISE AND SUNSET
1.2.7

Name: ______________________

Date: ______________________

Date	Sunrise ☼ ↑	Sunset ☼ ↓

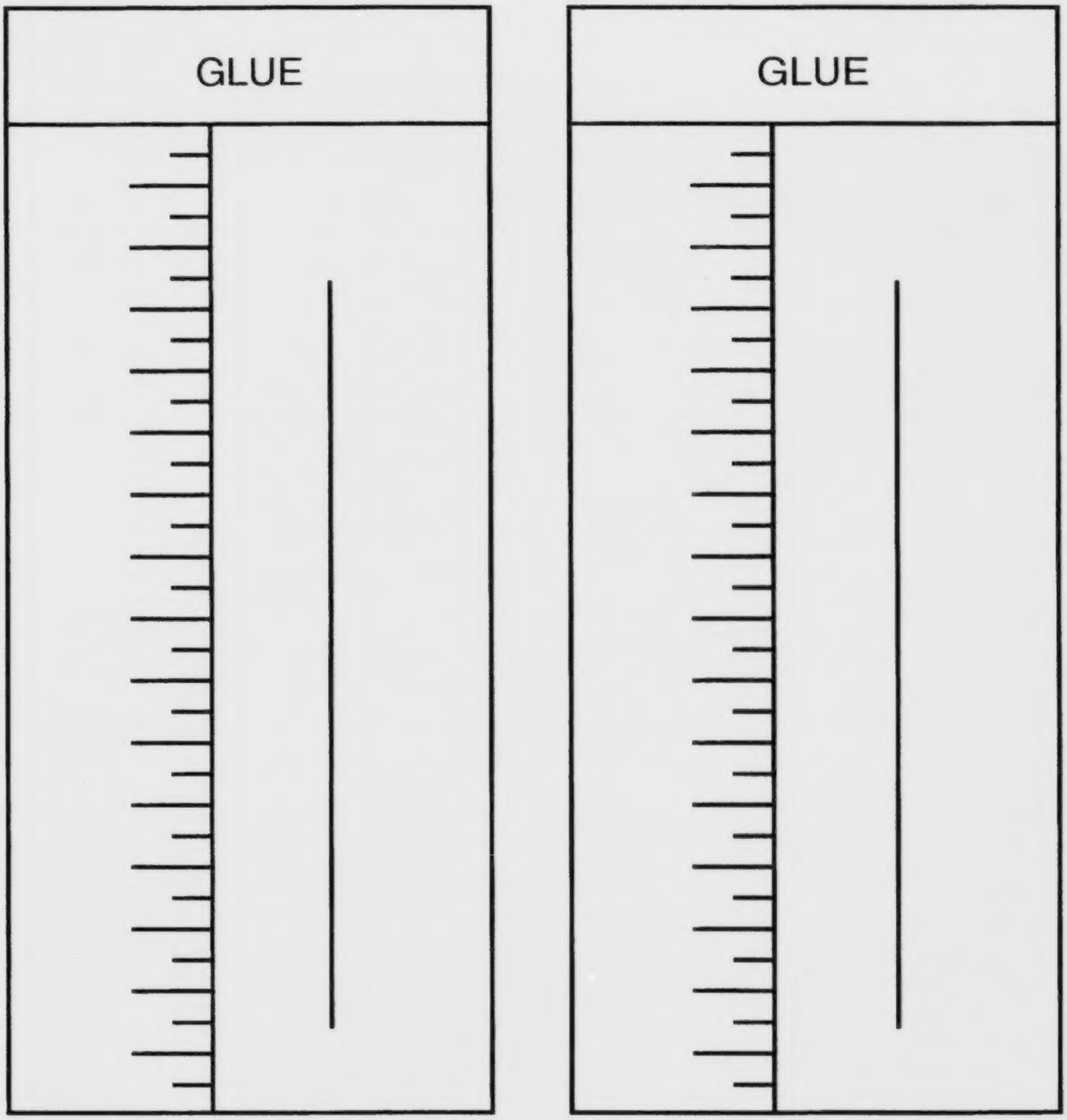
Date	Sunrise ☼ ↑	Sunset ☼ ↓

DASH

CLASS TIME LINE 1.2.8A

Name: ______________________

Date: ______________________



Cut one strip for each month. Each one-half centimeter is equal to one day. Cut off excess for months with fewer days. Label months. Glue strips together. Begin with current month.

DASH

DAY AND NIGHT IN SUMMER
1.2.8B

Name: ____________________

Date: ____________________

DATE	SUNRISE	SUNSET	OBSERVATIONS

DASH

THE SUN
1.2.9

Name: ____________________

Date: ____________________

WHERE?	WHEN?

SEASONS
1.2.10

Name: ____________________

Date: ____________________

EVENT	DATE	LENGTH OF DAY	LENGTH OF NIGHT	OBSERVATIONS
FALL EQUINOX				
WINTER SOLSTICE				
SPRING EQUINOX				
SUMMER SOLSTICE				

DASH

CLOCKS
1.2.11

Name: ______________________

Date: ______________________

What do you need to make your clock?

Draw a picture of your clock. Label it.

Tell how your clock works.

DASH

MOONRISE AND MOONSET
SP 1.2.12

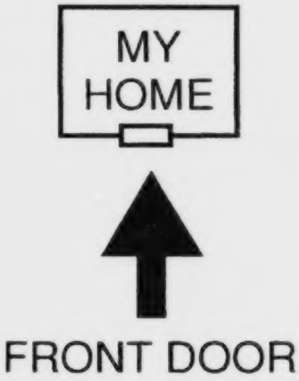
Name: ______________________

Date: ______________________

Label the directions at your home using N, S, E and W.

Draw a crescent moon to show where the moon RISES at your home. In which direction does the moon rise? ______________________

Draw a full moon to show where the moon SETS at your home. In which direction does the moon set? ______________________



DASH

GRADE ONE
CLUSTER 3

Animals

1.3.1 Living and Non-Living Things
1.3.2 Defining Living and Non-Living Things
1.3.3 Animal Survey
1.3.4 Animal Key
1.3.5 Animal Needs
1.3.6 Planning to Raise a Small Animal
1.3.7 Building Cages
1.3.8 Metamorphosis
1.3.9 Classroom Pets

1.3.1 LIVING AND NON-LIVING THINGS

OBJECTIVES

The students
- Collect living and non-living things.
- Describe and identify living and non-living things.

BACKGROUND

This activity is a companion to 1.3.2 DEFINING LIVING AND NON-LIVING THINGS. The two activities should be done together or within a day or two of each other. This first activity is a game in which students try to guess what an object is from the description provided by other students.

STUDENT ROLES

Scientist
Game participant

MATERIALS

clean 1/2-pint milk cartons
5 X 8 cards
pencils
Student Page 1.3.1 THE COLLECTION GAME

PRODUCTS

Description of objects
Completed Student Pages

PROCEDURES

1. **Introduce the collection game. Have the students work in teams of two.**

    - Give each team a small 1/2-pint milk carton.

- Have the students put small air holes in the top to let any animals they might collect breathe.

- Instruct teams that they are to go outside and secretly collect one object to put in their carton.

- Secretly assign equal numbers of teams to collect each of the following objects:
  - Something that is not alive.
  - Something that moves by itself.
  - Something that is alive but does not move by itself.

2. **Have teams complete Student Page 1.3.1 THE COLLECTION GAME.**

Have them give the following information in 4 words or less:

- What is the color of the object?
- What is it made from?
- What does it needs to live?
- What does it do?
- Draw its shape.
  ✔ The drawing is not made until it is needed during the game.

3. **Explain the game rules and roles of the participants.**

- The object of the game is to describe each object so well that someone else will know what it is.
- Team members' job—describe their object.
- Teacher's job—record descriptive terms on 5 x 8 cards.
- Panel members' job—guess the object according to rule 3 below.
- Rule 1. Teams cannot in their description
  - Use the object's name (worm, stick, etc.).
- Tell whether it is a plant or an animal.

- Tell whether it is living or non-living.
- Rule 2. Teams must give the information in the order recorded.
  ✔ Color, what it is made from, what it needs, what it does, its shape.
- Rule 3. A panel of 4–6 students must determine
  - First, whether the object is living or non-living.
  - Second, if living, whether the object is a plant or an animal.
  - Third, if non-living, whether it once was alive or was never living.
  - Fourth, what the object is.

4. **Learn to play the game by using examples such as the following to practice identifying objects.**

Object:	Car	Horse
Color/s:	Blue, black	Brown
Made from:	Metal, cloth, rubber, plastic	Meat, bone, fur
Needs:	Gasoline, air, water	Air, water, grass, movement
Does:	Moves	Moves, grows, reproduces
Shape:	(draw)	(draw)

5. **Play the collection game using objects the students collect and the information they record.**

1.3.2 DEFINING LIVING AND NON-LIVING THINGS

OBJECTIVES

The students
- Define living and non-living things.
- Define never-living and once-living things
- Define plants and animals.
- Develop a dichotomous key for living and non-living things.

BACKGROUND

This activity follows and builds on Activity 1.3.1 LIVING AND NON-LIVING THINGS. In this activity students use the descriptions of things developed for the collection game to see what specific information they used to identify things as living, non-living, never living, once living, a combination of once living and never living, plant or animal.

Students make a wall chart using a dichotomous key to separate items into two categories of things. By continuing this process, scientists can separate things into unique categories in eight to ten steps. More general categories are used here, so only four steps are needed. Since the process is not complete, we have a "semi-dichotomous" key.

STUDENT ROLES

Scientist
Game participant

MATERIALS

chart paper
felt pens
pencils
Working Dictionary
5 X 8 descriptive cards or Student Pages 1.3.1 THE COLLECTION GAME
Student Page 1.3.2 LIVING AND NON-LIVING THINGS

PRODUCTS

Class chart living and non-living things
Working definitions for living, non-living, never-living, once-living , and plants and animals
Completed Student Pages

PROCEDURES

1. **Have the students separate the living and non-living things collected in Activity 1.3.1 LIVING AND NON-LIVING THINGS.**

   - On chart paper, divide all things into living and non-living things as shown in Figure 1.3.2A.
   - Have the student teams place their 5 X 8 cards describing their object from Activity 1.3.1. into one of the two categories.
   - Have students tell why they placed their cards where they placed them.

2. **Have the students create working definitions for living and non-living things.**

   Possible examples are
   - Living things are things made of woody material or meat, skin, and bone. They grow and reproduce.
   - Non-living things are things made of dead or non-growing woody material, meat, skin, bone, or other materials such as metals and rocks.

   Write these definitions on the living and non-living things. Chart and record them in the Working Dictionary.

3. **Subdivide non-living things into never-living and once-living things on the chart as shown in Figure 1.3.2B.**

   - Have the students with non-living things move their cards to never-living and once-living Things. Have students tell why they placed their cards where they did.

4. **When students discover that some things are made of both once-living and non-living things (pencils, boxes, belts, etc.), create the category, combination things, which contains never-living and once-living parts. See Figure 1.3.2B.**

5. **Have the students create working definitions for once-living things, never-living things, and combination things.**

   Possible examples are
   - Once-living things are made of woody material or meat or skin or bone, from dead animals and plants.
     ✓ That no longer grow and reproduce.

   - Never-living things are things such as iron, rock, etc., made from matter other than woody material, meat, skin, and bone.

   - Combination things have parts made of both once-living and never-living things.

   - Write these definitions on the chart and record in the Working Dictionary.

   - Have the students with non-living things glue their cards to one of the three categories.

6. **Subdivide living things into plants and animals on the chart as shown in Figure 1.3.2C.**

   - Have students with living things cards place them in plants or animals.

   - Have students tell why they placed their cards as they did.

7. **Have the students make working definitions for plants and animals.**

   Some possible definitions are
   - Plants are made of woody material and grow and reproduce.

   - Animals are made of meat, shell, or skin bone and grow and reproduce.

   - Write these definitions on the chart and record them in the Working Dictionary.

   - Have students with living things cards glue them to the chart in the plant or animal category.

8. **Complete the Student Page 1.3.2 LIVING AND NON-LIVING THINGS by having students draw or write the names of examples for each category.**

ILLUSTRATIONS

ALL THINGS	
Non-living Things	Living Things

Figure 1.3.2A

<table>
<tr><td colspan="3">ALL THINGS</td></tr>
<tr><td colspan="2">Non-living Things</td><td>Living Things</td></tr>
<tr><td>Never Living Things</td><td>Once Living Things</td><td rowspan="2"></td></tr>
<tr><td colspan="2">Combination Things
(to be added as needed)</td></tr>
</table>

Figure 1.3.2B

<table>
<tr><td colspan="4">ALL THINGS</td></tr>
<tr><td colspan="2">Non-living Things</td><td colspan="2">Living Things</td></tr>
<tr><td>Never Living Things</td><td>Once Living Things</td><td rowspan="2">Plants</td><td rowspan="2">Animals</td></tr>
<tr><td colspan="2">Combination Things
(to be added as needed)</td></tr>
</table>

Figure 1.3.2C

1.3.3 ANIMAL SURVEY

OBJECTIVES

The students
- Extend the animal identification key.
- Identify animals.
- Correlate seasons with the developmental cycles of some animals.

BACKGROUND

In this activity students develop a sense of how the seasons are related to the developmental cycles of animals. The OSA should be visited systematically during the school year. These visits should be coordinated with studies of plants in the OSA. Other visits by students should be encouraged. Ideally, OSA visits are in fall (the last of September or early October), winter (late January or early February), and spring (when caterpillars first appear).

Each of the surveys should have the same structure. A new map is made for each season. During each survey the students identify the animals in the plot, mark on their maps where those animals were found, add any new animals to the identification key (see Activity 1.3.4 ANIMAL KEY), and note interactions between animals and plants on the Student Page.

STUDENT ROLES

Zoologist
Ecologist

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MATERIALS

10-meter line from Activity 1.10.1 METER-STRING CAN
stapler
plot maps from Activity 1.10.2 OUTDOOR STUDY AREA MAPPING
chart paper
glue
pencils
clipboards
Student Page 1.3.3 SEASONS AND ANIMALS

PRODUCTS

Class seasonal maps (chart paper with group plot maps attached)
Completed Student Pages

PROCEDURES

1. **Have the students plan and organize the OSA animal survey.**

   Items needing attention are
   - Resetting of boundary lines.
   - Recording of areas where animals are found on the map.
   - Collecting new animals for identification. See Activity 1.3.7 BUILDING CAGES.

2. **Have the students carry out the data collection in the OSA and record their information.**

   This part of the activity includes
   - Putting animal data on the season map.
   - Adding new animals to the animal identification key.
     ✓ See Activity 1.3.4 ANIMAL KEY.
   - Completing Student Page 1.3.3 SEASONS AND ANIMALS.

3. **Discuss the fall survey.**

   Some suggested questions are
   - What animals did you find?
   - Did everyone find the same kinds of animals?

- Were there some animals that were found in special places?
- Were there any dead animals?
- Were there any animals "just passing through"?
  ✓ Cats, rats, birds?
- Is there any evidence of interaction of plants and animals? If so, what?

4. Discuss the winter survey.

Some suggested questions are
- What animals did you find?
- Did everyone find the same kinds of animals?
- Did anyone find the same kind of animal that was found last time?
- Did anyone find new animals?
- Were there some animals that were found in special places?
- Were there any dead animals?
- Were there any animals "just passing through"?
  ✓ Cats, rats, birds?
- Were there as many different kinds of animals as last time?
- Is there any evidence of interaction of plants and animals? If so, what?

5. Discuss the spring survey.

Some suggested questions are
- What animals did you find?
- Did everyone find the same kinds of animals?
- Did anyone find the same kind of animal that was found last time?
- Did anyone find new animals?

- Were there some animals that were found in special places?
- Were there any dead animals?
- Were there any animals "just passing through"?
  ✓ Cats, rats, birds.
- Were there as many different kinds of animals as last time?
- Is there any evidence of interaction of plants and animals? If so, what?
- Are there changes in some animals that seem to occur in relationship to seasons?
- Are there certain kinds of animals that seem to die off during the seasons we have watched? Which kinds?
- Are there certain kinds of animals that do not seem to die off during the seasons we have watched? Which kinds?

1.3.4 ANIMAL KEY

OBJECTIVES

The students
- Continue to classify living things.
- Develop a semi-dichotomous key for invertebrates.

BACKGROUND

In this activity students capture animals and then develop a semi-dichotomous key. The concept of classification was introduced in Activity 1.3.1 LIVING AND NON-LIVING THINGS and Activity 1.3.2 DEFINING LIVING AND NON-LIVING THINGS.

This activity is repeated at the OSA each season. Several things are accomplished each time. An animal key to the OSA is created and updated. This is an extension of the living and non-living things chart begun in Activity 1.3.2 DEFINING LIVING AND NON-LIVING THINGS. One or more examples of each new animal in the plot are collected and caged. This does not need to include vertebrates such as toads, snakes, lizards, mice, etc. Each of the animals need to be named. Various reference books can be used or students can create their own names. This is not a course in animal taxonomy. Animals need to be returned to the plot. Most animals can be caged for several hours before they need to be returned. Short-term cages are needed for this activity. See Activity 1.3.7 BUILDING CAGES.

It is important to determine whether there are stinging insects or other dangerous animals in the plot ahead of time. If this is the case, directions for handling and collecting will need to be modified.

STUDENT ROLES

Zoologist
Taxonomist

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MATERIALS

cages from Activity 1.3.7 BUILDING CAGES
marking flags (small pieces of cardboard to write cage numbers on)
nails or wooden skewers
spoons
catching cups
hand lenses
chart paper
library reference books
Student Page 1.3.4 OSA ANIMALS

PRODUCTS

OSA animal key
Completed Student Pages

PROCEDURES

1. **Have students plan the field part of the study.**

   Items needing discussion are
   - Building cages. See Activity 1.3.7 BUILDING CAGES.
   - Collecting techniques.
   - Identifying stinging organisms.
   - Marking the location where each organism was found so that animals can be returned.
   - Checking that there is only one kind of animal in a cage.

2. **Capture one or more examples of each kind of animal in each group's OSA plot.**

   - Mark the location of each capture with a flag bearing the same number as that found on the animal's cage.

3. **Have students create an animal classification key.**

   This activity is most easily done in an open area of the classroom.

- Introduce the classification by asking whether there is some way we can divide all the animals into two different groups? All of the members of one group should have one common property that the others don't have.
- Compare how it is like sorting things into living and non-living things.
- Have all students put their animal cages in the proper category on a piece of chart paper.
- Write the name above the category.
- Continue the process until students run out of characteristics for separation. See Figure 1.3.5A.
- Use student suggestions or library reference books to name animals.

4. **Make a class chart OSA animal key.**

    - Complete Student Page 1.3.4 OSA ANIMALS.
    - Make a class chart using the semi-dichotomous animal key developed by the students.
    - Draw and label pictures of the OSA animals on the key.

5. **Have students return animals to their plots. Keep cages and flags for later surveys.**

ILLUSTRATION

<table>
<tr><td colspan="4">ANIMALS</td></tr>
<tr><td>No legs</td><td colspan="3">Legs</td></tr>
<tr><td rowspan="2"></td><td>More than 8 legs</td><td colspan="2">8 legs or less</td></tr>
<tr><td></td><td>8 legs</td><td>Less than 8 legs</td></tr>
</table>

Figure 1.3.4

1.3.5 ANIMAL NEEDS

OBJECTIVES

The students
- Start an inventory of animal needs.
- Identify water, food, air, and waste elimination as basic needs of animals.

BACKGROUND

This is a companion activity to 1.4.5 PLANT NEEDS in which students keep a record of what different plants need to survive.

This record is updated as needed. A group of students can be responsible for reminding the class when entries should be added to the inventory.

STUDENT ROLES

Zoologist
Naturalist

MATERIALS

chart paper
Student Page 1.3.5 ANIMAL NEEDS

PRODUCTS

Class chart animal needs
Completed Student Pages

PROCEDURES

1. **Review Activity 1.3.2 DEFINING LIVING AND NON-LIVING THINGS. Discuss what living things need that non-living things do not need.**

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2. Introduce Student Page 1.3.5 ANIMAL NEEDS.

Have students work alone or in pairs to complete their Student Pages.

Use words or pictures to
- Predict what kinds of things animals need.
- Give examples of evidence of these needs from their previous experience and observations.

3. Discuss student data and record findings on class chart animal needs.

Some suggested questions are
- What do animals need?
- What evidence did you find for these needs?
- Were your predictions correct?

1.3.6 PLANNING TO RAISE A SMALL ANIMAL

OBJECTIVES

The students

- Identify the kinds of animals that exist in the outdoor study area (OSA) that can be raised in the classroom.
- Plan for the care of a small animal.

BACKGROUND

This activity should be done with the spring survey of plants and animals in the OSA. Start the activity when caterpillars begin to emerge. Students may choose a wide variety of animals to raise. With some creative guidance students will include caterpillars.

Students plan for the food requirements, weekend care, and any special needs of their OSA animals

STUDENT ROLE

Zoologist

MATERIALS

reference books
Student Page 1.3.6 SMALL ANIMAL CARE PLAN

PRODUCTS

Plans for raising small animals
Completed Student Pages

PROCEDURES

1. **Discuss what it takes to keep a small animal from the OSA alive.**

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Have student groups consider

- Which animal to raise.
- How many animals to raise.
- What type of cage is needed.
- What kind of food it needs.
- How to get the food.
- What special care must be taken.
- How to care for the animal over weekends.
- What sort of daily record keeping is needed.
- What questions do they want to find answers for.

2. **Make a plan for raising a small animal and record it on Student Page 1.3.6 SMALL ANIMAL CARE PLAN.**

1.3.7 BUILDING CAGES

OBJECTIVES

The students
- Make cages for keeping small animals.
- Consider the needs of animals in designing a cage.

BACKGROUND

Prior to doing this activity, read the Focus Book, A SURPRISE FOR MOM, with the students which emphasizes respect for animal life.

There are two types of animal housing considered in this activity. Short-term cages are used in Activity 1.3.3 ANIMAL SURVEY and Activity 1.3.4 ANIMAL KEY. Long-term cages are made for use in Activity 1.3.8 METAMORPHOSIS.

The cage designs should be invented by the students based on the needs of their selected animal. Use the Inventor's Box to encourage student designs.

STUDENT ROLES

Zoologist
Ecologist

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MATERIALS

Focus Book, A SURPRISE FOR MOM
glass jars
pint-sized milk cartons
plastic wrap
Styrofoam cups
scissors
plastic tape
stapler
old nylon stockings or lightweight fabric
clear plastic cups
rubber bands
other materials as requested by students
Student Page 1.3.7 CAGES

PRODUCTS

Small animal cages
Completed Student Pages

PROCEDURES

1. **Read and discuss the Focus Book, A SURPRISE FOR MOM.**

2. **Have student groups identify the kind of animal they want to collect or raise.**

   - Discuss whether the animal is to be kept for a short or long time.

   - Discuss the animal's needs for space, light, ventilation, etc.

3. **Have students design and build long-term or short-term cages for the OSA animals they plan to collect or raise. See Figures 1.3.8A and 1.3.8B.**

   Have them
   - Invent the cage based on the animal's needs.

   - Build the cage from materials in the Inventor's Box or as requested.

   - Record the design on Student Page 1.3.7 CAGES.

ILLUSTRATIONS

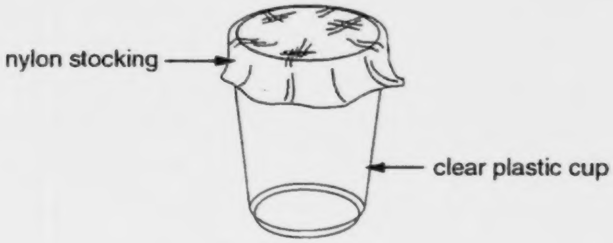
nylon stocking
clear plastic cup

Figure 1.3.7A Sample Short-Term Cage

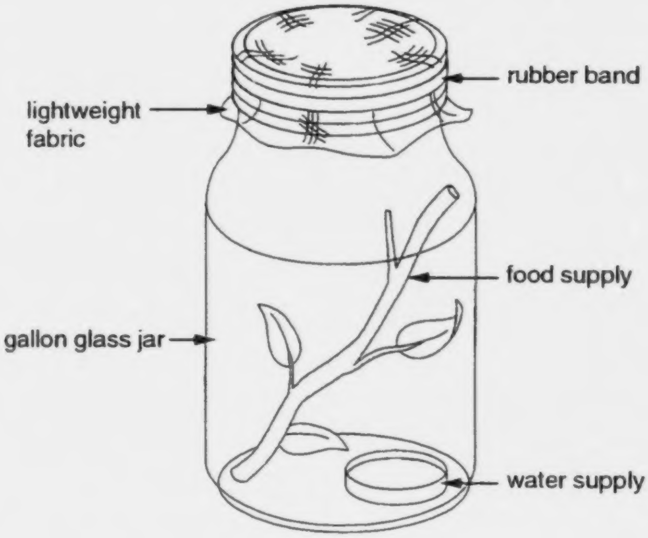
rubber band
lightweight fabric
food supply
gallon glass jar
water supply

Figure 1.3.7B Sample Long-Term Cage

1.3.8 METAMORPHOSIS

OBJECTIVES

The students
- Raise small animals.
- Practice carrying out a long-term plan with major responsibility.
- Observe and record what happens to small animals in captivity.
- Observe metamorphosis.

BACKGROUND

One of the most exciting events of the seasonal changes in OSA animal populations occurs in the spring of the year when insects undergo metamorphosis. This event can normally be studied up close in the classroom. Students should have completed Activity 1.3.6 PLANNING TO RAISE A SMALL ANIMAL before starting this activity.

In this activity students carry out the plan they have designed. They should modify it as needed. They keep a daily or regular record of what happens to the animal. At the end of the activity they return the animal to the field.

There should be a minimum of teacher input into students' observation and care activities. The principal concern should be for the humane treatment of the animals. If problems arise, students will normally have enough time to start observing another animal.

Butterflies are the most easily observed insects. It is important that newly hatched butterflies have sunshine in which to complete the solidification of their wings. Butterflies should be allowed to fly away as soon as they have completed the wing formation process, so that they do not suffer wing damage.

STUDENT ROLES

Zoologist
Ecologist

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MATERIALS

cages from Activity 1.3.7 BUILDING CAGES
clipboards
food and water for animals
small animals
Student Page 1.3.8 RAISING SMALL ANIMALS

PRODUCTS

Adult insects
Completed Student Pages

PROCEDURES

1. **Have students capture their animals according to their plan.**

2. **Have students carry out their observations and care activities as planned.**

   Have them
   - Share observations regularly.
   - Observe changes in the cycle of animals undergoing metamorphosis.
   - Record their observations on Student Page 1.3.8 RAISING SMALL ANIMALS.

3. **Have students return their animals to the field after they have completed their study.**

4. **In summary, discuss the activity with the students.**

   Some suggested questions are
   - Did all animals go through a metamorphosis?
   - What were the stages in the metamorphosis?
   - Did all the animals go through the same stages?
   - Do animals in the field go through the same stages?
   - Do all animals of the same kind seem to go through metamorphosis at the same time?

- Do different kinds of animals go through metamorphosis at different times?
- Does metamorphosis seem to be associated with a season?
- What role do plants play in the metamorphosis of insects?
- Does anyone know the name given to the development changes or insects?
  ✔ If not, introduce the term metamorphosis.

1.3.9 CLASSROOM PETS

OBJECTIVES

The students
- Take responsibility for the care of classroom pets.
- Make a concept map about pets.
- Revise their Working Definition of pets.

BACKGROUND

An important component of the DASH program is the care of classroom pets. The students learn to take care of their pets' needs beginning in kindergarten. In the first grade they continue pet study and also watch the changes that occur in the animal life in their outdoor study area. Their study includes beginning observation of the metamorphosis of insects.

Use this activity to establish the routine care required to meet the needs of classroom pets.

STUDENT ROLE

Animal caretaker

MATERIALS

chart paper
markers
animals
cages
food
water
newspaper or litter
Working Dictionary
Student Page 1.3.9 CLASSROOM PET

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PRODUCTS

Well-cared-for animals
Class chart pet care
Responsibility Chart
Working definition of pets
Concept map pets
Completed Student Pages

PROCEDURES

1. **Introduce the classroom pet to the students with a concept map pets.**

   Have them include
   - How to handle the pet.
   - Food and water requirements.
   - Cage maintenance.
   - Other needs of the particular pet.

   Demonstrate the handling and care of the pet as necessary.

2. **Have the students complete Student Page 1.3.9 CLASSROOM PET and then make a pet care chart and post it near the pet's cage.**

3. **Have the students add pet care jobs to their Responsibility Chart.**

4. **Have the class revise their working definition of pets and record the changes in their Working Dictionary.**

THE COLLECTION GAME
SP 1.3.1

Name: ______________________

Date: ______________________

GROUP:
Color:
Made from:
Needs:
Does:
Draw its shape.

DASH

LIVING AND NON-LIVING THINGS
SP 1.3.2

Name: ______________________

Date: ______________________

All Things

Non-living things

Living things

Never living things

Once living things

Plants

Animals

Combinations

DASH

SEASONS AND ANIMALS

SP 1.3.3

Name: ______________________

Date: ______________________

SEASON:	
ANIMAL	OBSERVATIONS

DASH

OSA ANIMALS 1.3.4

Name: ____________________

Date: ____________________

Name of OSA animal:
Season found:
Draw a picture of your animal.

DASH

ANIMAL NEEDS
SP 1.3.5

Name: ____________________

Date: ____________________

PREDICTED ANIMAL NEEDS	EVIDENCE AND OBSERVATIONS

DASH

SMALL ANIMAL CARE PLAN
SP 1.3.6

Name: ____________________

Date: ____________________

ANIMAL:	
NEED	PLAN TO TAKE CARE OF NEED

DASH

CAGES
SP 1.3.7

Name: ____________________

Date: ____________________

ANIMAL:

Draw a picture of your small animal cage.
Label any important parts.

DASH

RAISING SMALL ANIMALS
SP 1.3.8

Name: ____________________

Date: ____________________

ANIMAL:

DATE	OBSERVATION

DASH

CLASSROOM PET
SP 1.3.9

Name: ____________________

Date: ____________________

PET'S NAME:
Draw a picture of our class pet.
Draw pictures of some things our class pet needs.

DASH

GRADE ONE
CLUSTER 4

PLANTS

1.4.1 Plant Identification
1.4.2 Plant Survey
1.4.3 Plant Pressing
1.4.4 Plant Key
1.4.5 Plant Needs
1.4.6 Plant Life Cycle
1.4.7 Edible Plant Parts
1.4.8 Plant Parts Animals Eat

1.4.1 PLANT IDENTIFICATION

OBJECTIVES

The students
- Discover how common properties are used in the identification of plants.
- Discover how differences in properties are used to distinguish one plant from another.

BACKGROUND

To study seasonal effects on plants, a technique is needed to identify which plants are in the outdoor study area (OSA) at any given time. Students first explore properties of several examples of one kind of plant while looking for common identifying properties. Then students explore properties of several different kinds of plants, looking for differentiating properties.

There are problems in plant identification. The same plant may look quite different during each stage of its development. These differences provide opportunities for exciting discoveries.

STUDENT ROLE

Botanist

MATERIALS

OSA plants
assorted reference books on plants
glue
Student Page 1.4.1 IDENTIFYING PLANTS

PRODUCTS

Identification of OSA plants
Completed Student Pages

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PROCEDURES

1. **Introduce the problem of identifying plants.**

   Ask such questions as these:
   - What do you think will happen to the plants in our OSA between now and the time that school lets out?
     ✓ Lead to the idea of change in numbers, kinds, and conditions.

   - How could we test our predictions?
     ✓ Discuss and develop the idea of observing the OSA over time. Point out that we will not be able to visit the OSA every day.

   - If the plants change in the OSA, how can we tell whether we have the same plants?
     ✓ Discuss and develop the idea of finding some way of identifying plants.

2. **Have student groups go outside and find three examples of the same kind of plant.**

   Select four parts from one plant that could be used to identify all the examples as being the same kind of plant.

   Some suggested questions are

   - What parts did you choose that help you to identify your plants as being the same kind?

   - Why did you choose those four parts?

3. **Have students go outside and collect the same parts collected earlier from three plants that are different from the first kind of plant.**

   Ask such questions as these:
   - How do you know that these plants are different from the first plants?

   - Do parts from this last group of three plants look the same as or different from the parts you used to identify the first plants?

   - Can you use these parts to identify plants as being from different kinds of plants?

- If not, can you select other parts that will help you to identify different plants?

4. **Have groups work together to see whether their selected plant parts can be used to identify like and different plants in each other's collection.**

   Discuss
   - The parts that seem the best for identification of different plants.
     ✓ Work to a consensus that includes leaves, stems, flowers, seeds, and bark with comments on odor, color, irritation, etc.

5. **Name the different plants used in the activity. These may be common, botanical, or descriptive names invented by students.**

6. **Have students glue the plant parts they have used to identify plants to Student Page 1.4.1 IDENTIFYING PLANTS.**

1.4.2 PLANT SURVEY

OBJECTIVES

The students
- Make herbaria.
- Identify plants.
- Observe season-related cycles of plants.
- Note differences in behavior of annuals and perennials.

BACKGROUND

This activity should be done after the outdoor study area (OSA) has been mapped. See Activity 1.10.2 OUTDOOR STUDY AREA MAPPING. The OSA should be visited systematically at least three times in the course of the school year. Visits should be coordinated so students survey both plants and animals. See Activity 1.3.3 ANIMAL SURVEY. Other visits by students should be encouraged. Ideally, visits would be in the
- Late summer, early fall, the last part of September, or early October.
- Winter, late January, or early February.
- Spring, when caterpillars first appear.

Each of these surveys should have the same general structure. Differences will be recorded on the student pages. During these surveys students initially identify the plants in their plot and make herbarium sheets. They mark on their maps where those plants are growing. After future visits students make additional herbarium sheets for any new plants that have come in since the last set of sheets were made and note any structural changes in plants already identified in the plot. In addition students should take note of interactions between animals and plants.

STUDENT ROLE

Botanist

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MATERIALS

herbarium sheet construction materials (See Activity 1.4.3 PLANT PRESSING)
10-meter lines (See Activity 1.7.1 METER-STRING CAN)
stapler
plot maps
chart paper
glue
clipboards
Student Pages 1.4.2A FALL OSA PLANT SURVEY
1.4.2B WINTER OSA PLANT SURVEY
1.4.2C SPRING OSA PLANT SURVEY
1.4.2D SEASONS AND PLANTS

PRODUCTS

Herbarium sheets
Seasonal maps (chart paper with plot maps attached), one for each seasonal survey
Completed Student Pages

PROCEDURES

1. Have students organize and carry out the OSA study.

Items needing attention are

- Setting out of boundary lines.
- Recording areas where plants are found on the map.
- Recording changes in plants.
- Collecting samples of plants for the herbarium.
- Collecting materials to make the herbarium sheets.
- Making the herbarium sheets for new plants and new plant structures.
- Posting seasonal change on new maps.
- Completing the student pages for each survey.

2. **Discuss the Fall Survey and complete Student Page 1.4.2A FALL OSA PLANT SURVEY.**

Ask such questions as these:

- What plants did we find?
- Did everyone find the same kinds of plants as everyone else?
- Were there some plants that were found in special places?
- Were there any dead plants?
- Were there any plants that had seeds?
- Were there any plants that had flowers?
- Were there any plants that had new buds?
- Were there any plants that had lost their leaves?

3. **Discuss the Winter Survey and complete Student Page 1.4.2B WINTER OSA PLANT SURVEY.**

Some suggested questions are

- What plants did we find?
- Did everyone find the same kinds of plants as everyone else?
- Did anyone find the same individual plants they found last time?
- Did anyone find any new plants? How can we show this on our map?
- Have any of the plants that were alive the last time died?
- Have any plants grown seeds since the last time?
- Have any plants grown flowers since the last time?
- What might the flowers become?
- Have any plants grown fruit since the last time?
- Have any plants grown new buds since the last time?
- What might the buds become?

- Have any of the plants lost their leaves since last time?
- What happened to the leaves?

4. **Discuss the Spring Survey and complete Student Page 1.4.2C SPRING OSA PLANT SURVEY.**

   Ask such questions as these:
   - What plants did we find?
   - Did everyone find the same kinds of plants as everyone else?
   - Did anyone find the same individual plants they found last time?
   - Did anyone find any new plants? How can we show this on our map?
   - Have any of the plants that were alive the last time died?
   - Have any plants grown seeds since the last time?
   - Have any plants grown flowers since the last time?
   - What might the flowers become?
   - Have any plants grown fruit since the last time?
   - Have any plants grown new buds since the last time?
   - What might the buds become?
   - Have any of the plants lost their leaves since last time?
   - What happened to the leaves?

5. **Have students summarize their OSA surveys and complete Student Page 1.4.2D SEASONS AND PLANTS.**

   Some suggested questions are
   - Are there changes in plants that occur in relationship to seasons?
   - Is there a sequence that occurs in the way plants grow?
   - Are there certain kinds of plants that seem to die?

- What kinds of plants die?
- Are there certain kinds of plants that do not die?
- What kinds of plants do not seem to die?

1.4.3 PLANT PRESSING

OBJECTIVES

The students
- Press plant parts for a herbarium sheet.
- Identify plants by botanical, common, or other names.

BACKGROUND

To study plant changes in the outdoor study area (OSA), it is necessary to collect plant specimens. This collection will give a picture of the changes in plant population through late summer, fall, winter, and spring.

Students should be encouraged to make a pressing every time a new plant appears. Ask students to try not to kill the plant in making their collection of parts. Students should check each new plant against existing plants in their collection and those of other groups. If the plant was found before, they should use the existing name. Each time that there is a change in the plant-a flower forms that was not seen before, a seed or seed pod is first found, leaves change colors-add these new structures to the herbarium record of the plant. All plants should be named. Use botanical, common, or student-created names. Use various plant reference books.

Use the following directions to press plants and make herbarium sheets.
- Place plant parts artistically on white absorbent paper. Botany paper, manila paper, drawing paper, or paper toweling will do.
- Write the name of the plant, the date, the season, and the student group in the lower right-hand corner in pencil.
- Place herbarium sheets between folded double sheets of newspaper to remove moisture.
- Layer herbarium sheets and newspapers (15–20).
- Place a stack of sheets and newspapers on a hard flat surface.
- Place a clipboard or flat board on top of the stack to distribute the weight evenly.
- Place the weight (cement block) on top and leave for one to two weeks.

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- When plants are dry, secure any loose parts with a drop of white glue.
- When the glue dries, place a stiff piece of paper or lightweight cardboard behind the herbarium sheet.
- Cover with clear plastic wrap and secure with tape.
- Herbarium sheets can be punched and bound together into group books.

STUDENT ROLE

Botanist

MATERIALS

absorbent white paper
stiff paper or lightweight cardboard (5 X 8 cards)
newspaper
glue
plastic wrap
tape
clipboards
pencils
heavy weight (cement block)
paper punch

PRODUCTS

Group herbarium sheets

PROCEDURES

1. **Demonstrate how to prepare herbarium sheets for pressing plants. Have students work along with the demonstrator.**

   Some suggested questions are
   - Which parts did we decide would make it easiest to identify the plant?
   - Why would we want to show both the top and bottom sides of a leaf?
   - Why might we want to use a tiny amount of glue?

- Why should we write both the name of the plant and the name of the group that produced the herbarium sheet before we press the plant?

2. **Have students make herbarium sheets each time new plants are found in their plot.**

EXTENSION

- Have students press plants to decorate bookmarks, stationery, etc.

1.4.4 PLANT KEY

OBJECTIVES

The students
- Continue to classify living things.
- Develop a semi-dichotomous key of plants.

BACKGROUND

This activity can be done anytime after the herbarium sheets are first made. See Activities 1.4.2 PLANT SURVEY and 1.4.3 PLANT PRESSING. Students again use a dichotomous key. Remember that all botanical dichotomous keys have been constructed out of arbitrary decisions of botanists. This activity is concerned with the process of making a key rather than precise plant identification. For this reason we call the student key a semi-dichotomous plant key.

Key generation is left to the invention of student groups after the preliminary division of plants into woody and non-woody. Students divide their herbarium materials into woody and non-woody plants then extend the division with their own invented subdivisions. One possible example might be

```
                          PLANTS
                          /    \
         Woody                           Non-woody
         /   \                           /        \
Trees        Not  Trees         Grasses             Not Grasses
             /        \                    (etc.)
          Bushes    Not Bushes
```

STUDENT ROLES

Botanist
Taxonomist

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MATERIALS

herbarium sheets
paper
Student Page 1.4.4 PLANT KEY

PRODUCTS

Semi-dichotomous plant key
extension of dichotomous key begun in Activity 1.3.1 LIVING AND NON-LIVING THINGS
Completed Student Pages

PROCEDURES

1. **Review the Class Chart constructed in Activity 1.3.2 DEFINING LIVING AND NON-LIVING THINGS.**

   Ask
   - How did we classify living, non-living, and once-living things? Work for a review of the original classification.

2. **Introduce the problem of classifying the herbarium materials we have collected so far.**

   Point out that we want to find out what kinds of things are like each other.

   Ask such questions as these:
   - Can we divide the plants into two different groups? ✔ Introduce the idea of woody and non-woody if students don't come up with it.

   - How is this like sorting things into living and non-living things?

   - Can we divide this group into two groups?

3. **Have student groups complete their plant keys for the OSA plots and then record them on Student Page 1.4.4 PLANT KEY.**

4. **Have groups report on their plant keys and discuss which one seems to work best.**

- Construct a class plant key.
- Add the plant key to the class chart living and non-living things.

1.4.5 PLANT NEEDS

OBJECTIVES

The students
- Start an inventory of things that plants need to survive.
- Identify some of the basic needs of plants.

BACKGROUND

This activity is parallel to Activity 1.3.5 ANIMAL NEEDS. Students begin keeping a record of what plants need to survive. Over several years of observation, students will also learn that plants and animals give things back to their environment.

The record can be filled in periodically as an inventory. A group of students can be made responsible for reminding the class when entries should be made on the chart.

STUDENT ROLES

Botanist
Naturalist
Farmer

MATERIAL

Student Page 1.4.5 PLANT NEEDS PREDICTIONS

PRODUCTS

Class chart plant needs
Completed Student Pages

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PROCEDURES

1. **Review 1.3.2 LIVING AND NON-LIVING and discuss what living things do that non-living things do not do.**

   Point out that we want to
   - Be able to predict things that we will find out in the future.
   - Try to find examples of what we have predicted.

2. **Introduce the Student Page 1.4.5 PLANT NEEDS PREDICTIONS.**

   - Have students predict what kinds of things they will find that plants need.
   - Have students give examples of evidence from their studies to date.

3. **Begin a class chart plant needs with the students.**

   - Based on the evidence cited for students' predictions, make a list of plant needs the class agrees to.
   - Assign some students to remind the class when entries should be added to the chart.

1.4.6 PLANT LIFE CYCLE

OBJECTIVES

The students
- Observe the growth of plants from seed to fruiting plant.
- Observe that plants need water.
- Identify the changing structure of plants in their developmental sequence.
- Practice linear measurement skills.
- Review plant parts.

BACKGROUND

This activity is designed to provide students with a visual experience in the development of a bean plant from seed to flowering and fruiting. Students observe and keep daily records of the sequence and size of developing structures.

The activity is done in three stages. During the first stage, preparation and planting, sanitation is essential. To prevent contamination, hands should be washed whenever handling the beans. In preparing the growing chambers, it is probably best to have the holes in the cups prepunched. Have the students work along as you demonstrate the assembling and planting in the double-cup growing chamber. Be sure the water tray is deep enough so that water will reach the holes in the bottom of the inside cup.

Have the students invent their own system of data collection for stage two, observation and germination. They should observe growth of plants in both the inside and outside cups. When the beans between the cups become moldy or dried, discard the outside cup and continue observing only the beans in the inside cup.

The third stage, maturation, takes the growth of the plants to the point where they flower and fruit. When the plants are 10–12 cm tall, transplant them (cups and all) into a gallon can. After transplanting, they can be put outside in the sun during the day when the temperature is warm enough.

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STUDENT ROLES

Botanist
Farmer

MATERIALS

clear, plastic cups—soft, flexible
paper toweling
scissors
bleach
jar for soaking beans
shallow pan for water
cup or jar to carry water
potting soil
bean seeds (lima or bush beans)
string
metric rules
bean sprouts
hand lenses
paper
gallon cans
Student Page 1.4.6 GROWING A BEAN PLANT

PRODUCTS

Growing bean plants
Student pictures
Completed Student Pages

PROCEDURES

1. **Set the stage by showing students some bean sprouts and having them recall the bean sprouts they grew in kindergarten.**

   Some suggested questions are
   - What do you think bean sprouts are?
   - What do you think they were before they were bean sprouts?
   - What do you think would have happened to the sprouts if we had continued to let them grow?
   - What would you like to know about bean sprouts?

Explain that to answer these questions we can grow beans so that we can see them as they grow.

2. **Prepare the beans for planting.**

   - Soak the bean seeds overnight in water.
   - Kill mold by washing the seeds in a bleach solution
     ✔ 5 ml bleach or 1 tsp to 1 liter or 1 qt of water
     right before planting and then rinsing in clean water.

3. **Using a hand lens, have students observe a soaked seed before planting.**

   Have them
   - Remove the seed coat and look at it.
   - Tell what they think the seed coat might do for the seed.
   - Open up a bean and look inside.
   - Tell what they think the structure might become.
   - Draw a picture of what they see.
   - Tell what else they would like to know about seed growth.

4. **Assemble the double-cup growing chamber.**

   - Punch holes in the bottom of two wide, flexible, plastic cups of the same size.
   - Line the outside of one clear plastic cup with damp paper toweling.
   - Place the paper-covered cup inside the other cup.
   - Fill the inside cup with moist, garden-quality soil. See Figure 1.4.6.

5. **Have students plant the seeds and set their growing chambers in a water pan.**

   - Plant three seeds between the paper and the outside cup so that the seed can be seen.

- Plant three seeds in the soil about 4-5 cm (1 1/2-2 in) deep.
- Place planted cups in a shallow tray that has 1-2 cm (1/3-2/3 in) of water. Water will go through the holes in the bottom of the cups and keep the towel and soil moist.

6. **Have students observe and record data on the growing seeds on Student Page 1.4.6 GROWING A BEAN PLANT.**

   - Discuss and agree upon the kinds of things that will be recorded.
   - Observe and record the developing plant structures.
   - Measure and record the length of structures. Use a wet string stuck to the outside of the cup to measure twisted or curved roots and stems. Stretch the string out and measure its length.
   - Continue until the seed beans are moldy or dried. Then remove the outside cup, beans, and paper. Continue with the inside cup alone.
   - Observe the emergence of the developing structures from the inside cup. Draw, label, and measure the length of the stem regularly. Record dates.
   - If more than one seed germinates, the population should be reduced to one plant by the end of the 2nd or 3rd week.
   - Ask students for their questions and investigations.

7. **When the bean plants are in danger of tipping over, transplant them, along with their cups, into a coffee can of moist soil.**

   - Enlarge the holes in the plastic cup. Roots will shortly go through the holes in the cup into the soil of the can.
   - Holes in the bottom of the can will keep the plants moist when set in water.

8. **Discuss and summarize the activity with students.**

   Some suggested questions are
   - What did the parts of the embryo in the seed develop into?

- What does the bean plant need to grow?
- What does the bean plant need soil for?
- Where do the seeds of beans come from?
- What do you think will happen to the bean plant after the beans are harvested?

EXTENSIONS

- Have students work with growth sequence cards in the science centers.
- Have students create a developmental mural on beans with the growth data.

ILLUSTRATION

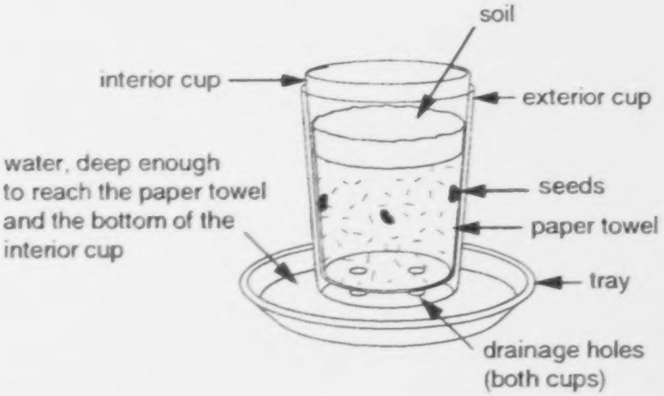
soil
interior cup
exterior cup
water, deep enough to reach the paper towel and the bottom of the interior cup
seeds
paper towel
tray
drainage holes (both cups)

FIGURE 1.4.6 Double-Cup Growing Chamber

1.4.7 EDIBLE PLANT PARTS

OBJECTIVES

The students
- Identify the parts of plants that common foods come from.
- Discover that other animals eat the same parts of plants as people.

BACKGROUND

This activity provides an inventory of plant parts that people eat and opens a discussion on how this same food is eaten by other animals. It should be followed by Activity 1.4.8 PLANT PARTS ANIMALS EAT. Verification and correction of the work of individuals and groups come when the bulletin board display is assembled by the entire class.

STUDENT ROLES

Home economist
Farmer

MATERIALS

paper
crayons
colored marking pens
glue
chart paper
scissors
magazines (optional)
Student Page 1.4.7 PARTS OF PLANTS PEOPLE EAT

PRODUCTS

Bulletin board display parts of plants people eat
Completed Student Pages

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PROCEDURES

1. **Begin by asking questions about what parts of plants we eat.**

   Ask such questions as these:
   - Does anyone know of a root that we eat?

   - Does anyone know a stem that we eat?

2. **Have students draw or cut out magazine pictures and glue them into the proper categories--roots, stems, leaves, flowers, fruit, seeds--on Student Page 1.4.7 PARTS OF PLANTS PEOPLE EAT.**

   - Students should verify their work within their group.

3. **Make a large bulletin board display plant parts people eat using the category headings from Student Page 1.4.7 PLANT PARTS PEOPLE EAT.**

   - Give each student one edible plant part outline that they are to color.

   - Have students pin their plant part to the bulletin board and give it a name.

   - Get class consensus on category and color. If the color is incorrect, the reverse side can be recolored.

4. **Discuss the question, "Are there other animals that eat the same things that we eat?"**

   Some further discussion questions are
   - Can anyone think of an animal that eats any of the foods on our bulletin board display?

   - Where else could we look to find out what animals eat?

EXTENSION

- Students can bring in pictures of other foods that people eat that are parts of plants and add them to the bulletin board.

1.4.8 PLANT PARTS ANIMALS EAT

OBJECTIVES

The students
- Identify plant parts that animals.
- Identify plant parts that particular animals eat.
- Observe that most of the food for invertebrate animals comes from plants.

BACKGROUND

This activity provides an inventory of the kinds of plant parts that animals in the outdoor study area (OSA) eat. This shows the interaction of plants and animals in the OSA.

The ideas involved in this activity are most evident in the spring and can be part of the spring survey.

STUDENT ROLES

Zoologist
Botanist
Naturalist
Ecologist

MATERIALS

clipboards
herbarium sheets (for identification)
OSA animal key (for identification)
paper
pencils
chart paper
hand towels
Student Page 1.4.8 PARTS OF PLANTS OSA ANIMALS EAT

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PRODUCTS

Bulletin board display
Completed Student Pages

PROCEDURES

1. **Ask students whether anyone has noticed what the animals in the OSA eat. Announce that we are going to try to find out what the OSA animals are eating.**

2. **Have students identify what is being eaten and what animals are doing the eating.**

   - Look for evidence that plant parts are being eaten.
   - Identify the plant and plant part being eaten.
   - Try to identify the animal that is doing the eating.
   - Use a trowel to see whether any animals seem to be eating at the roots of plants.

3. **Have students record their information on Student Page 1.4.8 PARTS OF PLANTS OSA ANIMALS EAT and make a bulletin board display.**

   - Make a bulletin board display showing the plants, the plant parts eaten, and the animals that eat them.
   - Cross validate by having students compare their own group and other group observations.

4. **Discuss the activity with the students.**

   Some suggested summary questions are
   - Were there any parts of the plants that weren't eaten?
   - What do you think would happen if we had a garden where we have our OSA?

- What do we mean when we say other animals are in competition with us?
- Do animals eat the same plant parts that we eat?

DASH

IDENTIFYING PLANTS
1.4.1

Name: ____________________

Date: ____________________

PLANT PART	PLANT 1	PLANT 2	PLANT 3	PLANT 4

DASH

FALL OSA
PLANT SURVEY
1.4.2A

Name: ____________________

Date: ____________________

NAME OF PLANT	
PICTURE	
SPECIAL PLACE (WHERE)	
ALIVE OR DEAD?	
SEEDS (DRAW)	
FLOWERS (DRAW)	
FRUITS (DRAW)	
BUDS (DRAW)	
LEAVES (DRAW)	
OTHER OBSERVATIONS & PREDICTIONS	

DASH

WINTER OSA PLANT SURVEY 1.4.2B

Name: ____________________

Date: ____________________

NAME OF PLANT	
PICTURE	
SAME AS LAST TIME OR NEW?	
SPECIAL PLACE (WHERE)	
ALIVE OR DEAD?	
SEEDS (DRAW)	
FLOWERS (DRAW)	
FRUITS (DRAW)	
BUDS (DRAW)	
LEAVES (DRAW)	
OTHER OBSERVATIONS & PREDICTIONS	

DASH

SPRING OSA PLANT SURVEY 1.4.2C

Name: ______________________

Date: ______________________

NAME OF PLANT	
PICTURE	
SAME AS LAST TIME OR NEW?	
SPECIAL PLACE (WHERE)	
ALIVE OR DEAD?	
SEEDS (DRAW)	
FLOWERS (DRAW)	
FRUITS (DRAW)	
BUDS (DRAW)	
LEAVES (DRAW)	
OTHER OBSERVATIONS & PREDICTIONS	

SP 1.4.2D

DASH

SEASONS AND PLANTS 1.4.2D

Name: ______________________

Date: ______________________

DRAW SOME PICTURES TO SHOW HOW THE SAME PLANT CHANGED DURING THE SEASONS.

NAME OF PLANT: ______________________________

FALL	WINTER	SPRING	SUMMER

NAME OF PLANT: ______________________________

FALL	WINTER	SPRING	SUMMER

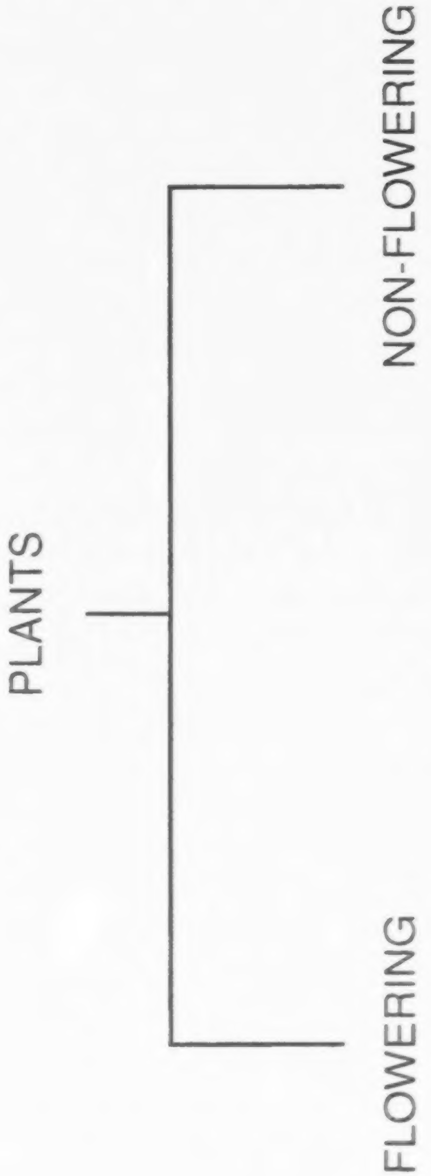
PLANTS THAT DIED	PLANTS THAT DID NOT DIE
HOW ARE THESE PLANTS ALIKE?	HOW ARE THESE PLANTS ALIKE?

HOW ARE THE PLANTS THAT DIED DIFFERENT FROM THE PLANTS THAT DID NOT DIE?

PLANT KEY
SP 1.4.4

Name: ____________________

Date: ____________________


PLANTS
NON-FLOWERING
FLOWERING

DASH

PLANT NEEDS PREDICTIONS
1.4.5

Name: ____________________

Date: ____________________

Make a list or draw pictures of the things you think plants need.

GROWING A BEAN PLANT
1.4.6

Name: ____________________

Date: ____________________

OUTSIDE CUP		INSIDE CUP	
DATE	OBSERVATIONS	DATE	OBSERVATIONS

SP 1.4.7

DASH

PARTS OF PLANTS PEOPLE EAT
1.4.7

Name: ____________________

Date: ____________________

SEEDS	
FRUITS	
FLOWERS	
LEAVES	
STEMS	
ROOTS	

DASH

PARTS OF PLANTS OSA ANIMALS EAT
1.4.8

Name: ______________________

Date: ______________________

WHICH PLANT?	WHICH PLANT PART?	WHICH ANIMAL?

DASH

GRADE ONE
CLUSTER 5

Food and Nutrition

1.5.1 Basic Three Food Groups
1.5.2 Cooking
1.5.3 Measuring Volume

1.5.1 BASIC THREE FOOD GROUPS

OBJECTIVES

The students
- Identify foods in each of the categories of the basic three system.
- Define activation, regulation, and fabrication as categories of body processes.
- Select a variety of foods in meal planning.

BACKGROUND

Nutrition is one of the most important school subjects. It is a relatively new subject in the curriculum. Until the last twenty years or so, most homes provided traditional meals that were built around food practices that had sustained whole cultures for thousands of years. With the advent of convenience and synthetic food, traditions were quickly lost. Our students now come to us without a clear sense of food traditions and therefore are at risk of malnourishment in not getting appropriate quantities of nutrients. The school is the only institution that can provide education in nutrition to all our children.

DASH provides a set of guidelines to help students make reasoned selection of food. It provides students with an understanding of the science behind selection guidelines, and gives them a practical experience in making these selections.

The nutritional goal of DASH is to establish a positive attitude and sustained commitment to good personal nutrition. This demands more than simple knowledge. It requires that the school environment provide models of adults using their knowledge to guide their own selection of nutritious food, school lunches that use appropriate nutritional guidelines, and adults who encourage students to talk about food and analyze their eating for good nutrition whenever possible.

This activity starts with a re-examination of animal body processes. **Activation** refers to all of the animal's movements and warming processes. **Regulation** is all of the animal's internal control of operating processes, including body chemistry. **Fabrication** is all of the animal's growth and repair processes.

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Students are then introduced to the food use rhyme that defines each of these categories of processes and describes the foods that are rich in the nutrients necessary to support these processes. Then the rhyme is used to make a basic three food chart. Finally, students analyze the school lunch menu using their basic three food chart.

STUDENT ROLES

Nutritionist
Homemaker

MATERIALS

scissors
crayons
marking pens
chart paper
large food sample pictures
Student Pages 1.5.1A FOOD GROUPS
1.5.1B SCHOOL LUNCH

PRODUCTS

Foof use rhyme
Class basic three food chart
Class bulletin board food groups chart
Completed Student Pages

PROCEDURES

1. **Introduce the activity by reviewing with students the things that we and other animals do.**

This includes
moving
warming
eating
excreting
digesting
thinking
hearing
feeling
growing
repairing
maintaining
tasting
breathing
drinking
smelling
seeing

2. **Use the food use rhyme to help students find which of the things that we do come under the categories of activation, regulation, and fabrication.**

Activation	Regulation	Fabrication
moving	digesting	growing
warming	thinking	repairing
eating	hearing	maintaining
excreting	feeling	
breathing	smelling	
drinking	seeing	
tasting		

There is also a regulation component to each activation and fabrication process. This list includes only the major components.

3. **Have students use the rhyme to define each of the body processes.**

Activation	Regulation	Fabrication
Results in	Results in	Results in
running	digesting	building
crawling	defending	maintaining
climbing	seeing	repairing
jumping	thinking	growing
getting hot	controlling	making muscle
sweating	things inside	making bone
moving	directing what's supplied	fixing

4. **Use the rhyme to identify the kinds of foods that are rich in nutrients that help in the activation, the regulation, and the fabrication of the body processes.**

Activation	Regulation	Fabrication
grains	spinach	milk
butter	cauliflower	steak
sesame seed roll	corn on the cob	beans
sugar	applies	chicken
potato	oranges	liver
cereal	peaches	codfish
		ham
		eggs

5. **Have students develop a basic three food chart using cutouts from food ads in newspapers and magazines on Student Page 1.5.1A FOOD GROUPS.**

6. **Have students create a class basic food group chart or bulletin board using pictures of foods.**

   Develop a description of the three categories with the class. For example
   - Activation foods are high in starches, sugars, fats, and oils.
     ✔ Grains, cereals, butter, table sugar, etc.

   - Regulation foods are rich in vitamins and minerals.
     ✔ Fruits and vegetables.

   - Fabrication foods are rich in protein and calcium.
     ✔ Milk, eggs, fish, and meat.

7. **Have student groups analyze the school lunch menu using Student Page 1.5.1B SCHOOL LUNCH.**

8. **Discuss the three basic food groups. Have students create working definitions for activation foods, regulation foods, and fabrication foods. Record them in the Working Dictionary.**

   Some suggested questions are
   - What are the names of the three food groups?
   - What are some activation foods?
   - What kinds of foods are these?
   - What do activation foods help our bodies to do?
   - What are some regulation foods?
   - What kinds of foods are these?
   - What do regulation foods help our bodies to do?
   - What are some fabrication foods?
   - What kinds of foods are these?
   - What do fabrication foods help our bodies to do?

- What are some foods that belong to more than one food group? Which groups?
- Why do we need to eat lots of different kinds of foods?

EXTENSIONS

- Invent a chart that shows foods that can belong to more than one food group.
- Invite the food service manager to talk about the school lunch. Ask the food manager to emphasize the variety of foods, and the presence of milk, a cereal food, a protein food, a vegetable, and a fruit in each menu.

FOOD USE RHYME

Grains and butter, a sesame seed roll,
Potato and sugar, cereal in a bowl.

These are foods for activation.

For crawling and climbing, getting all hot,
For running and jumping, sweating a lot.

Ways to move are activation.

Spinach and cauliflower, corn on the cob,
Apples and oranges, pureed peaches in a glob.

These are foods for regulation.

For digesting and defending, controlling things inside,
For seeing and thinking, directing what's supplied.

Making bodies work right, that's regulation.

Steak and beans, roast chicken legs
Milk and codfish, ham served with eggs.

These are the foods of fabrication.

For building and maintaining, making muscles strong,
For repairing and growing, making bone that's long.

Growing and fixing, that's fabrication.

1.5.2 COOKING

OBJECTIVES

The students
- Use recipes to prepare and cook foods.
- Relate temperature to cooking.
- Compare the taste and smell of ingredients and the final cooked products.
- Compare the texture of ingredients and final cooked product.
- Practice volumetric measurement.
- Practice safety and cleanliness in cooking.

BACKGROUND

In Activity 1.5.1 BASIC THREE FOOD GROUPS students get a sense of the basic food groups and then discover that these basic foods are often combined in prepared foods. This activity is designed to explore some of the processes used to cook foods and to discover how cooking changes raw food ingredients.

Two days are needed for this activity. The first day is for planning and preparing; the second is for cooking. Christmas is an ideal time. Possible cooking projects are Christmas bread, cookies, or fritters.

Several things need to be considered. A sanitary surface on which to prepare the dough is needed. A classroom table can be covered with plastic. (A clean garbage bag can be used.) The students must wash their hands. Students will need aprons. (Clean garbage bags can be used.) There should be enough cooking equipment for all the children to participate.

STUDENT ROLES

Planner
Baker
Inventor

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MATERIALS

recipe
chart paper
recipe ingredients
cooking equipment
Student Page 1.5.2 CLASS RECIPE

PRODUCTS

Cooked food
Temperatures for the temperature chart
Completed Student Pages

PROCEDURES

1. **Describe the project of making a snack food to the students.**

    - Have students invent and make garbage bag aprons.

    - Have students invent a way to keep their work surface clean.

2. **Introduce the recipe and have students change it into a pictorial recipe on chart paper.**

    - Have students copy the chart onto Student Page 1.5.2 CLASS RECIPE.

3. **Have groups plan who is to do what in the cooking process.**

    This should include a temperature group.

4. Have students make the dough and then bake or fry it.

Have them

- Determine the temperatures of the oven, the frying pan, the bread, etc., and record them on the inventory of temperatures. See Activity 1.8.1 TEMPERATURE OF THINGS.

- Save a few of the ingredients to compare with the final dough and cooked product.

Ask such questions as these:

- Do the individual ingredients have the same taste as the final dough?

- Does the final dough have the same taste as the final cooked pastry?

- Are the look, smell, and feel of the individual ingredients the same as of the dough?

- Are the look, smell, and feel of the dough the same as of the final pastry?

- What has happened in the process of cooking?

- Why do we have to be so concerned about cleanliness?

1.5.3 MEASURING VOLUME

OBJECTIVES

The students
- Make tools for measuring fluid volume.
- Standardize a scale for fractions of a liter and quart.

BACKGROUND

This activity provides a tool for measuring the volume of liquids that will be used in cooking and experiments with liquids and gases. **The instruments are intended to provide only approximate measures.**

Metric — English
1 liter = 1000 milliliters = approx. 1 quart *
1/2 liter = 500 milliliters = approx. 1/2 quart = 1 pint
1/4 liter = 250 milliliters = approx. 1/4 quart = 1/2 pint = 1 cup
1/8 liter = 125 milliliters = approx. 1/8 quart = 1/4 pint =1/2 cup
* (1 liter= 1.057 quarts)

Students use the same general technique for subdividing volume measures that they used for linear measures when they divided a string by successively halving the length. The following directions describe this scaling process.

1) Select 2 quart jars (a quart is approximately equal to a liter). Jars must be matched pairs. Sides should not be tapered.
2) Put a piece of thin masking tape vertically up the side of each jar.
3) Make a class standard. Fill one jar to the beginning of the rounded shoulder. Mark the tape 1 liter and 1 quart. Make several standard jars before class. Use a waterproof marker.
4) Have students fill the standard and then pour the contents into one of their jars. Have them mark their tape 1 liter and 1 quart.

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5) Divide the water into two equal volumes by pouring half into the empty jar. Mark on the tape 1/2 liter and 1/2 quart. Mistakes are easily corrected by putting on another piece of masking tape.
6) Empty one jar and again divide the water in half. Mark on the tape 1/4 liter and 1/4 quart.
7) Challenge the students to find the three-quarter mark.
8) Keep the standard separate from the rest of the jars. Students can always check their instrument against the standard.

STUDENT ROLE

Instrument maker

MATERIALS

quart jars, 2 per group
1/2-inch masking tape
waterproof marking pens
water
small pouring jars
towels
Student Page 1.5.3 MEASURING VOLUME

PRODUCTS

Graduated jars
Completed Student Pages

PROCEDURES

1. **Introduce the activity by explaining that we need a way to measure liquids.**

   Explain to students that this is called volume measurement. Show a standard jar.

   Ask such questions as these:
   - How could we show the same volume in other jars?
   - How can we mark the jars so that we can always fill them to the same place?

2. **Help students invent their own graduated jar.**

   Ask such questions as these:
   - How can we measure out one-half of this jar of water?
   - How can we mark the 1/2-liter of water so that we can use the jar over and over to get the same volume.

3. **Help students invent their own way to measure 1/2 liter.**

   Ask such questions as these:
   - Who was able to measure 1/2 liter?
   - Can you demonstrate how you measured it?
   - How did you mark your jar?

4. **Help students invent a way to measure and mark 1/4 liter of water.**

5. **Help students invent a way to measure and mark 3/4 liter of water.**

6. **Discuss ways to use the measuring jars with the students. Record ideas on Student Page 1.5.3 MEASURING VOLUME.**

EXTENSIONS

- Challenge students to mark a jar to measure 1/8 liter of water.
- Introduce the milliliter equivalents of the liter.
- Tie into math lessons on quarts, pints, and cups by making measuring jars in English units.

DASH

FOOD GROUPS
1.5.1A

Name: ____________________

Date: ____________________

ACTIVATION FOODS	REGULATION FOODS	FABRICATION FOODS

DASH

SCHOOL LUNCH
1.5.1B

Name: ______________________

Date: ______________________

ACTIVATION FOODS	REGULATION FOODS	FABRICATION FOODS

WHICH FOODS CAN GO IN MORE THAN ONE GROUP?

FOOD	ACTIVATION	REGULATION	FABRICATION

How many different foods were in the menu? __________

DASH

CLASS RECIPE 1.5.2

Name: ______________________

Date: ______________________

RECIPE FOR:

INGREDIENT	HOW MUCH?

DIRECTIONS: ____

TO COOK:

TEMPERATURE? ____ HOW LONG? ____ HOW? ____

DASH

MEASURING VOLUME
1.5.3

Name: ____________________

Date: ____________________

Draw pictures of ways you could use your measuring jar.

DASH

GRADE ONE
CLUSTER 6

Health and Safety

1.6.1 Growth Chart
1.6.2 Tooth Chart
1.6.3 Brushing Teeth
1.6.4 Chewing
1.6.5 Air and Breathing
1.6.6 Getting Hurt
1.6.7 Staying Healthy
1.6.8 Safety Rules

1.6.1 GROWTH CHART

OBJECTIVES

The students
- Measure and record their weight or mass on the growth chart.
- Measure and record their height on the growth chart.
- Record their hand size on the growth chart.
- Record their foot size on the growth chart.
- Analyze the growth chart for trends over time.

BACKGROUND

This activity is started in kindergarten. Data are added each year to the longitudinal growth chart. Records can be stored in the students' Science Record Books.

Measurement of height and weight is done at the beginning and at the end of the year. Records can also be updated in January.

Foot and hand drawings are made at the beginning of the school year. By the end of the year students may be able to count the squares to get a measure of area. If not, omit this part of the activity, since it is done in later grades. The teacher, parent, helpers, or older students may have to assist first graders with their drawings and measurements.

STUDENT ROLES

Health worker
Doctor

MATERIALS

scales
metric linear scale
Student Page 1.6.1A GROWTH CHART
1.6.1B HAND AND FOOT

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PRODUCTS

Updated record on growth chart
Completed Student Pages

PROCEDURES

1. **Record students' height and weight on Student Page K.6.1 or Student Page 1.6.1A GROWTH CHART.**

   Ask such questions as these:

   - What is your height?
     ✔ Read answer in centimeters.
   - Who has lost height since last we measured height?
     ✔ Check for errors in measurement.
   - Who has stayed the same since we last measured height?
   - Who has grown since we last measured height?
   - How much have you grown?

   Repeat the same kinds of questions concerning weight.

2. **Have students trace their hands and feet on Student Page 1.6.1B HAND AND FOOT and record the area in number of squares covered.**

   Have students count
   - Whole squares in the drawing.
   - Squares that are half or more in the drawing should be counted as whole squares.
     ✔ Usually there will be about as many of the less than half-filled squares as there are of the more than half-filled squares.

   Repeat the same kinds of questions used with height and weight.

EXTENSION

- Have students make a graph of class heights in fall, winter, and spring.

1.6.2 TOOTH CHART

OBJECTIVES

The students
- Make a personal tooth count.
- Make a comparative adult tooth count.
- Observe the different kinds of teeth in the upper and lower jaws.
- Observe the changes in teeth over time.

BACKGROUND

The activity begins with identification of the different kinds and number of teeth in a child's jaw. Students will observe that, counting their missing teeth, they usually have the same number of teeth, normally 24. They will find the number of teeth in the upper jaw is the same as the number in the lower jaw, and the number on the right side is the same as the number on the left. Students will find that they generally lose their incisors first.

Next the students identify the teeth by name and compare their teeth with those of an adult. They will find that adults have 28–32 teeth, depending on where in their tooth cycle they are in growing wisdom teeth. (Some adults will never get wisdom teeth or have had them extracted.) Many adults will have artificial replacements for some or all of their adult teeth.

STUDENT ROLE

Dentist

MATERIALS

mirrors
Student Page 1.6.2 TOOTH CHART

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PRODUCTS

Completed Student Pages

PROCEDURES

1. **Introduce this activity by having students look into each other's mouth and then at their own mouth with a mirror.**

   Ask such questions as these:
   - Does your partner have the same teeth that you have? How can you tell?
   - Does your partner have missing teeth? How can you tell?
   - Do you have missing teeth? How can you tell?
   - How many teeth do you have in your upper jaw?
   - How many teeth do you have in your lower jaw?
   - How many teeth do you have on the right side of your lower jaw?
   - How many teeth do you have on the left side of your lower jaw?
   - Do you have new teeth coming in? If so, how big are they compared to your first teeth?

2. **Have students use Student Page 1.6.2 TOOTH CHART to record their tooth count. Save these in their Science Record Books.**

   Ask such questions as these:
   - Which of your teeth are incisors? Do you and your partner have the same number of incisors? If not, why not?
   - Which of your teeth are canine teeth? Do you and your partner have the same number of canines? If not, why not?
   - Which of your teeth are premolars? Do you and your partner have the same number of premolars? If not, why not?

- Which of your teeth are molars? Do you and your partner have the same number of molars? If not, why not?

- What kinds of problems do you have because you have missing teeth?

3. **Have students go home and ask an adult to let them count their teeth.**

Ask such questions as these:
- Have your parents lost teeth?

- How many teeth did they have when they had all of their teeth?

- What teeth, if any, did they have that you do not have?

- How long did it take them to get all of their teeth?

1.6.3 BRUSHING TEETH

OBJECTIVES

The students
- Practice brushing their teeth.
- Practice using dental floss.
- Use disclosure fluid to see how effective their brushing and flossing are.

BACKGROUND

This activity has no prerequisites. It is helpful if students can have toothbrushes at school so that good tooth care can be practiced. Students explore how brushing and flossing make a difference. They eat a high-carbohydrate food such as crackers, cake, bread, etc., followed by use of a disclosure fluid which contains food coloring. Food coloring stains whatever carbohydrates adhere to the teeth. Teeth are then brushed and again exposed to the disclosure fluid. Well brushed teeth will not be colored; poorly brushed teeth will still be colored.

Students need to be instructed in how to brush teeth properly and how to keep a toothbrush clean and sanitary.

Disclosure fluid is made by adding food coloring to slightly sweetened water. The fluid can be used as often after brushing as seems instructive.

STUDENT ROLES

Dentist
Hygienist

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MATERIALS

mirror
crackers
disclosing fluid: water, food coloring, a little sugar or corn syrup
toothbrushes
toothpaste
dental floss
small dispenser cups for disclosure fluid
plastic teeth model and large toothbrush (optional)
Student Page 1.6.3 BRUSHING TEETH

PRODUCTS

Completed Student Pages

PROCEDURES

1. **Have students look at each other's teeth.**

   Ask such questions as these:
   - Why do we brush our teeth?
   - When should we brush our teeth?
   - How do we brush our incisors?
   - How do we brush our molars?
   - How do we brush our premolars?
   - How do you floss your teeth?
   - Why do we floss our teeth?
   - How do your teeth feel when you run your tongue over them? Before brushing? After brushing?

2. **Have students eat a carbohydrate-laden food.**

   Ask such questions as these:
   - What do your teeth feel like now when you run your tongue over them?
   - What do you think has happened to your teeth?

- Look at your teeth in the mirror. What do you see?

3. **Have students use the disclosure fluid.**

   Ask such questions as these:
   - What does the disclosure fluid taste like?

   - Now look at your teeth in the mirror—what do you see?

   - Do your teeth look clean?

4. **Explain that the disclosure fluid colors the food left on the teeth.**

   - Discuss how students might clean off the disclosure fluid and the food it stained.
     ✔ Work students toward a consensus that they should clean their teeth and floss them.

   - Demonstrate proper brushing with a model if available.

5. **Have students brush again and then rinse with disclosure fluid a second time.**

   Check and discuss the cleanliness of their teeth.

6. **Discuss how to keep a toothbrush clean and sanitary.**

   - Mark toothbrushes so they can easily be identified by the owner.

   - Rinse toothbrushes thoroughly with water.

   - Hang the brush so that it does not touch any surface. This will also accelerate drying.

EXTENSIONS

- Invite a dental hygienist or dentist to talk to the class.

- Have students make a string of teeth by threading cut-out teeth on a string in the order of appearance in their mouths.

1.6.4 CHEWING

OBJECTIVES

The students
- Observe that swallowing is preceded by a complicated chewing process.
- Observe that different teeth are used at different times in the chewing process.
- Observe that saliva moistens food during chewing.

BACKGROUND

This activity continues the study of the importance of teeth. It provides an introduction to the process of chewing and swallowing as part of the long-term study of digestion.

STUDENT ROLE

Dentist

MATERIALS

mirrors
crackers
water
animal skulls with teeth (cow or horse and cat or dog)
Student Page 1.6.4A TEETH AND CHEWING
1.6.4B ANIMAL TEETH

PRODUCTS

Names of the different teeth
Completed student pages

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PROCEDURES

1. **Introduce the question of how we use our teeth.**

   Give each pair of students one cracker. Have one student bite into a cracker while the other one observes.

   Ask such questions as these:
   - Which teeth did you use to bite into the cracker?

   - How can you tell?

2. **Have the student chew up the cracker.**

   Ask such questions as these:
   - Which teeth did you use in chewing?

   - How do you know?

3. **Have the student swallow the cracker and describe how they swallowed.**

   Ask such questions as these:
   - What else happened to the cracker as it was chewed?
     ✔ Work toward the observation that a liquid was added to the cracker. Identify this liquid as saliva.

   Switch student roles and repeat Procedures 1–3.

4. **Have students brush their teeth. See Activity 1.6.3 BRUSHING TEETH.**

5. **Mark the teeth used in biting and chewing on Student Page 1.6.4A TEETH AND CHEWING.**

6. **Have students look at the skull or teeth of a cow or horse and of a dog or cat. Use the drawings on the Student Page 1.6.4B ANIMAL TEETH.**

   Ask such questions as these:
   - Do the cow's teeth look like your teeth? If so, how? If not, how are they different?

   - What does a cow eat?

   - What do you think the cow uses its front teeth for? Why?

- What do you think the cow uses its back teeth for? Why?
- Has anyone ever seen a cow eat? Can you describe it?
- Do the cat's teeth look like our teeth? If so, how? If not, how are they different?
- What does a cat eat?
- What do you think the cat uses its front teeth for? Why?
- What do you think the cat uses its back teeth for? Why?
- Has anyone ever seen a cat eat? Can you describe it?

EXTENSION

- Assign student groups to look at the teeth of different kinds of animals and report on the kind, the number of teeth, and the food that the animals eat.

1.6.5 AIR AND BREATHING

OBJECTIVES

The students
- Invent a way of measuring the amount of air they breathe in and out under different conditions of exercise.
- Begin the study of breathing.
- Observe again the physical properties of air (volume, can be captured, can be poured, etc.).
- Practice volume measurement.

BACKGROUND

This activity is designed to be introduced after PE or exercise. It is both a health and physical science activity. It is easily done during the study of air. See Activities 1.10.4–1.10.7. It reinforces or adds the idea that air has volume. Here students get a sense of how much air they inhale and exhale in breathing. Students invent a way to measure the volume of air.

Use the Inventor's Box to stimulate student inventions. Provide plastic bags, hoses, graduated and ungraduated jars, rubber bands, etc.

Some possible solutions to the problem of how to measure air are
- Students can blow into plastic or paper bags and then fold up the bag until the air is trapped at one end. This bag can be kept closed until a second breath is measured with a second bag. Bag size can be directly compared for relative size.
- One method of measuring the air is to breathe into plastic bag and then transfer the air by way of a plastic tube to a graduated measuring jar, filled with water.
- Students can blow through a plastic tube directly into a water-filled, inverted graduated jar.

STUDENT ROLES

Physiologist
Inventor

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MATERIALS

Inventor's Box
paper bags
balloons
clear plastic bags
standardized liter jars
graduated gallon jars
plastic tubing
water
towels
buckets
mops
Student Page 1.6.5 AIR AND BREATHING

PRODUCTS

Measuring methods
Completed Student Pages

PROCEDURES

1. **Introduce the activity after PE or some vigorous exercise.**

   Ask such questions as these:
   - How many are breathing harder than usual?
   - How often are you breathing each minute? Record this number.
   - Can you tell whether you are "inhaling" (taking in) more, less, or the same amount of air as you usually do when you breathe?
   - Can you tell whether you are "exhaling" (pushing out) more, less, or the same amount of air as you usually do when you breathe?
   - Can you invent a way to capture the air you exhale and measure how much there is?

2. **Have student groups invent methods for measuring the air they exhale.**

   Follow this with time for sharing of ideas, then a time for construction and testing.

Ask such questions as these:
- How did you capture the air?
- How did you measure it?
- Can you demonstrate your system?

3. **Have students measure the air they exhale when they are not exercising.**

Explain that they are to breathe out lightly until they would normally take a breath. Have each student do this several times. Use Student Page 1.6.5 AIR AND BREATHING to record data.

4. **Have students measure the air they exhale after they have exercised.**

Explain that they are to breathe out lightly until they would normally take a breath. Have each student do this several times. The volumes should be about the same each time.

Ask such questions as these:
- How does the amount of air we breathe when we exercise compare with the amount of air we breathe when we are not exercising?
- Can you think of a reason why we have such a difference?
- How does the number of times we breathe in a minute when we exercise compare with the number of times when we are not exercising?
- Can you think of a reason for this difference?
- What happens to the breathing of dogs and cats after they exercise?
- How long can you hold your breath? Test this.
- Do you have to breathe?
- Do we have to have air?

EXTENSIONS

- Challenge students to invent a way to measure the amount of air inhaled. If someone is successful, ask
    - How did you measure the amount of air you inhaled?
    - How would the amount of air that you inhale compare with the amount of air you exhale?

1.6.6 GETTING HURT

OBJECTIVES

The students
- Observe how sickness and injury are taken care of by adults.
- Keep a record of how long personal physical pain lasts.
- Keep a record of how long personal physical injury takes to heal.

BACKGROUND

This activity is part of the wellness series started in kindergarten. Now students begin to get a sense of how long an injury hurts and how long it takes to get well. It is ideal to introduce the activity early in the year when a student has been injured. Generally injury and sickness are most effectively discussed at the time they occur.

STUDENT ROLE

First aid student

MATERIAL

Focus Book, SATURDAY IN THE PARK WITH DAD
Student Page 1.6.6 PAIN AND RECOVERY

PRODUCTS

Completed Student Pages

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PROCEDURES

1. **Introduce the activity by reading the Focus Book, SATURDAY IN THE PARK WITH DAD, and talking about getting hurt.**

   Ask such questions as these:
   - Have you ever hurt yourself?
   - How did it feel?
   - What did you do about it?

2. **Have students begin keeping injury records on Student Page 1.6.6 PAIN AND RECOVERY.**

   Ask such questions as these:
   - What kinds of injuries have you recorded?
   - How long did they hurt?
   - How long did they take to heal?

   Review records regularly to ensure students record information.

   Post a reminder to complete records on the class First Aid Kit.

3. **Summarize and discuss the activity with the class.**

   Some suggested questions are
   - How long does an injury usually hurt?
   - Do some injuries hurt longer than others?
   - How long does an injury usually take to heal?
   - Do some injuries take longer to heal than others? Which ones?
   - Why should we try to avoid injury?

1.6.7 STAYING HEALTHY

OBJECTIVES

The students
- Evaluate their own understanding of aphorisms which state major concepts for physical and mental well-being.
- Keep a record of use of these concepts in their daily lives.

BACKGROUND

DASH exposes students to a wide range of recommended health practices. Mnemonic tools help them remember what to do to stay healthy. One device that probably had its beginnings at the campfires of our first speaking ancestors is the aphorism or pithy statement that captures a truth. Aphorisms can become so associated with our daily activities as to be triggered spontaneously at an appropriate moment to remind us that some action should be considered. Use this activity at the end of each semester.

Students rate each objective in terms of their understanding of an aphorism and how it has affected their behavior.

Understanding ratings are
1. I do not understand the aphorism. (no)
2. I understand the aphorism. (yes)
3. I can teach the aphorism to someone else. (teach)

Behavior ratings are
1. I do not practice the objective. (no)
2. I practice the objective some of the time. (some)
3. I practice the objective most or all of the time. (all)

Use the rating twice in the year, at New Year's and at the end of the school year.

STUDENT ROLES

Health consultant
Teacher

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MATERIALS

some aphorisms to live by
poster paper
colored markers
Student Page 1.6.7 APHORISMS

PRODUCTS

Aphorism posters
Completed Student Pages

PROCEDURES

1. **Introduce the idea of an aphorism to the students.**

   Explain that to really use aphorisms in our daily lives we must understand them and use them when we need them.

2. **Have students make aphorism posters.**

   Ask each student to explain the importance of their aphorism.

3. **Have students carry out their personal rating on Student Page 1.6.7 APHORISMS.**

   If students are unsure of what it means to teach, read the Focus Book, THERE'S A NEW KID COMING. See Activity 1.1.8 CONCEPT INVENTORY.

4. **Have students carry out their second rating at end of the school year.**

5. **Summarize and discuss the activity with the students.**

   Review each aphorism, asking why it is important.

SOME APHORISMS TO LIVE BY

	CONCEPT	SUGGESTED APHORISM
1.	Eat adequate and appropriate food.	Eat the basic three, in wide variety.
2.	Go slow on sugar, fat, and salt.	Slow down sugar, Slow down fat, A dash of salt is enough of that.
3.	Get 8 hours of sleep.	Sleep for eight, Wake up feeling great.
4.	Replace the water that you lose each day. Drink adequate amounts of liquids (6–8 glasses of water).	Six glasses in winter and eight in summer are my body's natural plumber.
5.	Wash hands before eating. Wash hands before handling food. Wash hands after using the toilet.	Wash hands before eating or fixing a hurt, After using the toilet or working in dirt.
6.	Keep lips in the water and off the fountain.	Someone else's dishes are Someone else's germs. Mouth in the water, Not in the fountain, Keeps those germs from growing and sproutin'.
7.	Attend to tooth care. Brush twenty up and twenty down.	Brush twenty times up And twenty times down, Inside, outside, all around. Floss in between To complete the routine.
8.	Attend to skin and hair care.	Healthy skin and hair Is clean skin and hair.

9.	Wear appropriate clothes for the weather and time of day.	Winter clothes feel comfortably warm. Summer clothes feel comfortably cool. Wear white at night.
10.	Make regular use of the toilet.	When nature calls, Listen and go, Wipe and wash, And flush, just so.
11.	Make your environment safe and clean.	A clean and safe space, Is a great work place.
12.	Seek help for wounds.	
13.	When sick stay away from others.	
14.	Cover your nose and mouth when sneezing or coughing.	Don't sneeze or cough with the cover off.
15.	Share with those about you.	Sharing with others is caring for others.
16.	Remember your responsibilities and carry them out.	Get the job done, Then have fun.
17.	Plan when you can.	Plan ahead.
18.	Help those who need help.	Lend a hand, when you can.
19.	Know the emergency phone number.	Remember 911 When emergencies come.
20.	Play a fair game.	Play fair with others And they'll play fair with you.
21.	Put things away when you're finished.	Finished for today? Then put your things away.
22.	Treat all living things with respect.	

1.6.8 SAFETY RULES

OBJECTIVES

The students
- Make safety rules for different places and situations.
- Make posters to illustrate their safety rules.
- Follow their safety rules.
- Observe what happens when people do not follow the rules.
- Explain why their rules are good or bad.

BACKGROUND

Start this three-part activity at the beginning of the year and finish near the end of the year when students have learned to write.

Part 1. Students decide with the teacher the rules they should follow at school and when they go to and from school. This is the second year of school for first graders, so many have already been exposed to these rules. These may include things such as
- Walk on the sidewalk whenever possible.
- Walk facing traffic on a road with no sidewalks.
- When crossing a street, stop, look left, look right, look left again. Be sure there are no cars coming.
- Where there are stoplights, cross only on "green" and "walk."
- Don't accept a ride from strangers.
- Know your telephone number and address.
- Know the emergency number.
- Wear light colors when walking in the dark.

Part 2. Students follow the rules. They observe and discuss what happens when people do and don't follow the rules.

Part 3. Students write an aphorism for each of their rules. The purpose of the activity is to have students think for themselves rather than to just obey orders.

STUDENT ROLES

Safety engineer

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Publicist

MATERIALS

poster paper
colored markers
crayons
paint
Student Page 1.6.8 SAFETY RULES

PRODUCTS

Rules
Posters
Reasons for rules
Completed Student Pages

PROCEDURES

1. **Introduce the need to have some rules about safety at school and while going to and from school.**

   Ask such questions as these:
   - What rules did you follow last year?
   - What rules should we follow in school this year?
   - What rules should we follow going to and from school this year?
   - Are there any new rules that we should have?
   - Why do we need different rules for different places?

2. **Have student groups make posters that tell what the rules are and why we should follow them. Hang them up in the classroom.**

3. **Have students observe what happens when rules are kept and broken.**
   Explain that students are to watch to see what happens when people don't follow the rules and when people do follow the rules.

   Hold a report session periodically.

3. **Have students observe what happens when rules are kept and broken.**
Explain that students are to watch to see what happens when people don't follow the rules and when people do follow the rules.

Hold a report session periodically.
✔ This is not a tattletale session. No names are used.

Some suggested questions are
- Did anyone see something good happen when people followed the rules?
- Did anyone see something bad occur when someone did not follow the rules?
- What did you see that tells us that we should follow our rules?
- Do we need our rules?
- Do we need any new rules?

3. **After a semester have students discuss why they think we should follow each of the rules, and discuss the rules that are not worthwhile.**

Have the group make up aphorisms that state the rule and the reason for it. Share these with the class. Add the aphorisms to the posters and record them on Student Page 1.6.8 SAFETY RULES.

Ask questions such as these:
- What did you find were reasons for your rule?
- Can anyone think of other reasons for the rule?
- Do we need any new rules?

EXTENSIONS

- Have students develop sets of rules, sayings, or posters for places outside of school.
- Invite a policeman to come and talk about safety going to and from school.

SP 1.6.1A

DASH

GROWTH CHART 1.6.1A

Name: ______________________

Date: ______________________

GRADE	DATE	HEIGHT		WEIGHT/MASS		HAND	FOOT	NOTES: Any changes in measurements?
	Month/Year	(Inches)	(Cm)	(Pounds)	(Kg)	(sq. cm)	(sq. cm)	
K								
1								
2								
3								
4								
5								
6								

SP 1.6.1B

DASH

HAND AND FOOT
1.6.1B

Name: ______________________

Date: ______________________

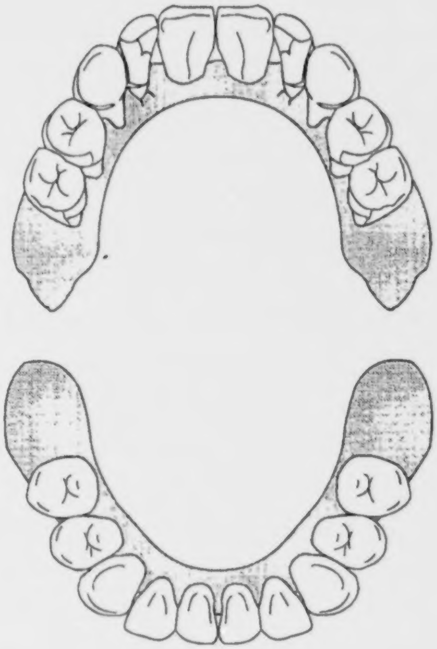
DASH

TOOTH CHART 1.6.2

Name: ______________________

Date: ______________________

Blacken any missing teeth.
Circle any new teeth.
Put an "X" on any teeth with cavities, fillings, or caps.



How many teeth do you have? ☐
How many teeth have you lost? ☐
How many new teeth do you have? ☐

BRUSHING TEETH
1.6.3

Name: ______________________

Date: ______________________

Make a list of good Toothbrushing Rules.

1. ______________________________

2. ______________________________

3. ______________________________

4. ______________________________

5. ______________________________

6. ______________________________

7. ______________________________

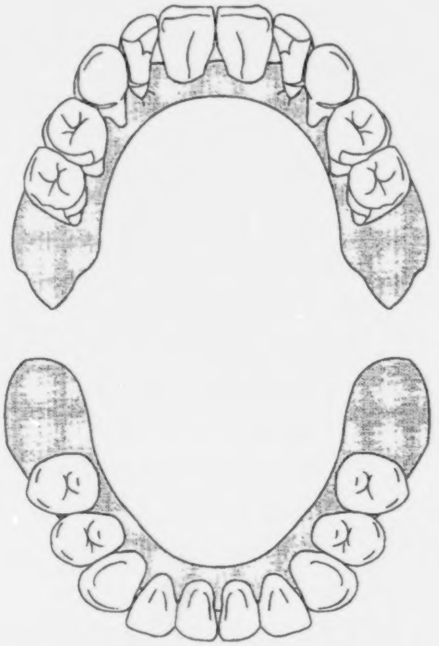
DASH

TEETH AND CHEWING
1.6.4A

Name: ______________________

Date: ______________________

Color chewing teeth green. Color biting teeth red.



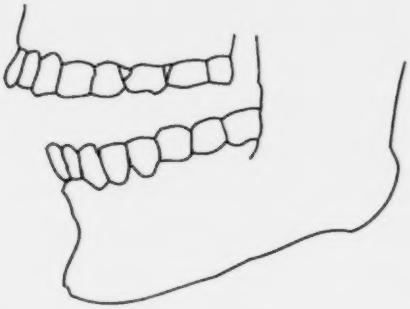
What do you think canine teeth are used for? ______________________

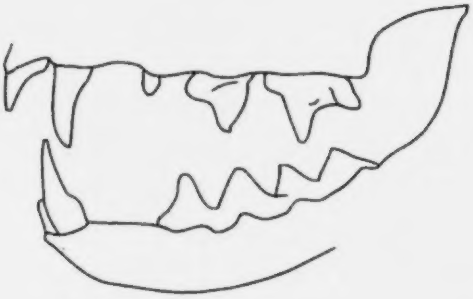
ANIMAL TEETH
1.6.4B

Name: ______________________

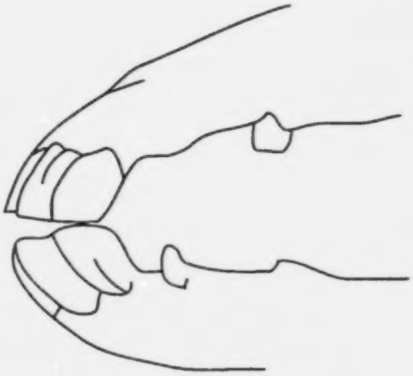
Date: ______________________

People Teeth





Cat Teeth



Horse Teeth

SP 1.6.5

DASH

AIR AND BREATHING 1.6.5

Name: ____________________

Date: ____________________

BREATHING	TEST NUMBER	HOW MUCH AIR?
Normal	1	
Normal	2	
Normal	3	
After exercise	1	
After exercise	2	
After exercise	3	

BREATHING	TEST	HOW MANY TIMES?
Normal	1	
Normal	2	
After exercise	1	
After exercise	2	

How long did you hold your breath?

_______ minutes _______ seconds

SP 1.6.6

DASH

PAIN AND RECOVERY 1.6.6

Name: ______________________

Date: ______________________

DATE OF INJURY	KIND OF INJURY	HOW LONG DID IT HURT?	DATE IT WAS HEALED	HOW LONG TO HEAL?

DASH

APHORISMS
1.6.7A

Name: ____________________

Date: ____________________

APHORISMS	UNDERSTAND			USE		
	YES	NO	TEACH	NO	SOME	ALL
1. Eat the basic three, in a wide variety.						
2. Slow down sugar, Slow down fat, A dash of salt is enough of that.						
3. Sleep for eight, Wake up feeling great.						
4. Six glass in winter and eight in summer are my body's natural plumber.						
5. Wash hands before eating or fixing a hurt, After using the toilet or working in dirt.						
6. Someone else's dishes Are someone else's germs.						

SP 1.6.7B

DASH

APHORISMS
1.6.7B

Name: ______________________

Date: ______________________

APHORISMS	UNDERSTAND			USE		
	YES	NO	TEACH	NO	SOME	ALL
7. Brush twenty times up And twenty times down, Inside, outside, all around. Floss in between To complete the routine.						
8. Healthy skin and hair Is clean skin and hair.						
9. Winter clothes feel comfortably warm. Summer clothes feel comfortably cool.						
Wear white at night.						
10. When nature calls, Listen and go, Wipe and wash, And flush, just so.						
11. A clean and safe space, Is a great work place.						

DASH

APHORISMS
1.6.7C

Name: ______________________

Date: ______________________

APHORISMS	UNDERSTAND			USE		
	YES	NO	TEACH	NO	SOME	ALL
12.						
13.						
14. Don't sneeze or cough With the cover off.						
15. Sharing with others Is caring for others.						
16. Get the job done, Then have fun.						
17. Plan ahead.						
18. Lend a hand, When you can.						
20. Remember 911 When emergencies Come.						

SP 1.6.7D

APHORISMS
1.6.7D

Name: ______________________

Date: ______________________

APHORISMS	UNDERSTAND			USE		
	YES	NO	TEACH	NO	SOME	ALL
20. Play fair with others And they'll play fair with you.						
21. Finished for today? Then put your things away.						
22. Treat all living things with respect.						

DASH

SAFETY RULES
1.6.8

Name: ____________________

Date: ____________________

Write the class safety aphorisms.

1. ....

2. ....

3. ....

4. ....

5. ....

6. ....

7. ....

8. ....

DASH

GRADE ONE
CLUSTER 7

Wayfinding and Transportation

1.7.1 Pacing
1.7.2 North, South, East, and West
1.7.3 Home
1.7.4 Map Distance
1.7.5 Making a Boat
1.7.6 Making a Lake
1.7.7 The Great Regatta
1.7.8 Floating and Sinking
1.7.9 Draining a Lake

1.7.1 PACING

OBJECTIVES

The students
- Gain a sense of distance through their walking.
- Practice measuring distance by walking.
- Practice counting by walking.

BACKGROUND

To do this activity students must be able to count to 10. It is better if they can count to 100 and ideal if they can count to 1,000 or more.

Students develop a feel for distance and space by using kinesthetic experiences. Walking is one such tool. A student knowing the number of their paces in a fixed distance can measure distance by walking.

This activity has two parts. Students count their personal number of paces in a measured distance and make a pacing scale. Then they use pacing to verify distances on field trips, on their neighborhood maps, etc.

STUDENT ROLES

Surveyor
Wayfinder

MATERIALS

meter-string cans from Activity 1.10.1 METER-STRING CAN
overhead
overhead projection of a number line 1–50
projection of a number line 1–100
Student Page 1.7.1 DISTANCE AND COUNTING

PRODUCTS

A pace scale
Completed Student Pages

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PROCEDURES

1. **Introduce pacing by asking students how we can find out how far away something is when we don't have a meter stick or a meter-string can.**

   Discuss the idea that we might use our bodies, pacing, or any objects we can make into a standard.

2. **Have students measure and mark a 10-meter line. Then have them walk the 10 meters using their normal stride, counting the number of steps they take silently, and then record the number on Student Page 1.7.1 DISTANCE AND COUNTING.**

   Ask such questions as these:
   - How many steps did you take? Record these numbers on an overhead number line.
   - Did we all take about the same number of steps?
   - Why might some people take more or fewer steps than others?
   - Can anyone predict about how many steps they would take in 20 meters?
   - How did you make your prediction?

3. **Have all students make a prediction and then walk 20 meters.**

   Ask questions similar to those above in procedure 2. Make predictions for 30 meters and test. Continue the process until most students are successful at predicting to within one step per 10 meters.

4. **Have students scale their pacing number line for up to 100 paces at 10-meter intervals on Student Page 1.7.1 DISTANCE AND COUNTING.**

5. **Give regular pacing assignments.**

- How far is it from one end of the hall to the other?
- From the room to the cafeteria?
  ✔ You will probably have to talk about the route to be used.
- From the room to the swings?

As students get more experienced with pacing and use of the number line, give them assignments that involve longer distances that can be confirmed with measurements on their neighborhood map.

EXTENSION

- Post a challenge of the week or day to see who can come closest to the measured distance between two fixed points.

1.7.2 NORTH, SOUTH, EAST, AND WEST

OBJECTIVES

The students
- Review and practice locating north, south, east, and west.
- Locate the north, south, east and west sides of their classroom and school campus.

BACKGROUND

This is a review of the skill of finding direction introduced in kindergarten.

Introduce the activity early in the school morning while the sun is low on the horizon. Start students inside the classroom by asking whether they can tell where the north side of the campus is. Review the body compass and then go outside and mark the north side of the campus. Have the students invent a way to mark the north. Discuss the need to locate a fixed place to stand when pointing to the marker.

Have students then identify the location of north wall in the classroom. Again locate a fixed place to stand when pointing in the direction of north.

STUDENT ROLES

Astronomer
Wayfinder

MATERIALS

body compass doggerel
markers for direction in classroom and campus
compass (See Activity 1.2.1 SKY AND WEATHER WATCH)
Student Page 1.7.2 NORTH, SOUTH, EAST, AND WEST

BEST COPY AVAILABLE

PRODUCTS

Direction markers
Completed Student Pages

PROCEDURES

1. **Read and act out the body compass doggerel with the students.**

Body Compass
Our body's a compass that we always can use
With it we can find any direction we choose.
Reach out your right hand to the sunrise
East's where the sun's first seen by our eyes.
Remember our right hand's placed over our heart
Whenever the flag salute we start.
Reach out your left hand to the sunset;
That's west out there in silhouette.
The sun goes overhead east to west
Before it can sink down to let us rest.
For north just follow our front-facing nose
It's the same direction as our toes.
South is the direction to take a seat
It's also our heels on the back of our feet.

While students are standing have them act out the responses to the following summarizing questions.

- Our right hand reaches in what direction?
- How do we know which is our right hand?
- Which hand reaches out to the sunrise?
- Our left hand points in what direction?
- How do we know which is our left hand?
- Which hand points to the sunset?
- Which part of our body faces north when we are a compass?
- Which part of our body faces south when we are a compass?
- Which direction is north?

- Which direction is south?
- How can we tell where the north is?
- What would you have to know to find north outside?

2. **Have the students learn the body compass rhyme.**

   Right rising, east
   Left leaving, west
   Nose north
   Seat south.

3. **Have the students invent a way to mark the north side of the campus.**

4. **Go outside and use the students' sense of direction to locate and mark the north side of campus.**

   Validate or refute using the body compass. If need be, go over the routine of extending the right hand toward the rising sun and the left toward the direction of the setting sun.

   Further validate using a magnetic compass. See Activity 1.2.1 SKY AND WEATHER WATCH.

   Ask such questions as these:
   - Where do you have to stand to have the marker on the north side of campus?
   - Are there places on campus where you could stand so that the marker would be east of you? West of you? South of you?

5. **Have the students mark the east, west, and south points of the campus, using the body compass as a guide.**

6. **Have the students label the north, south, east, and west points of the classroom.**

EXTENSION

- Construct a compass rose on the floor of the classroom or outside on the playground.

1.7.3 HOME

OBJECTIVES

The students
- Find where other people in class live.
- Locate their usual route home.
- Find the names of streets in their neighborhood.
- Practice using direction with maps.
- Identify prominent features in the neighborhood on maps.
- Review safety rules for going to and from school.

BACKGROUND

This activity involves parental help in learning students' addresses and phone numbers. Students will also need help to record the streets that are usually traveled and the turns made going to and from school. This is a good time to discuss street safety rules. See Activity 1.6.8 SAFETY RULES.

In some places it may be inadvisable to have the names and home locations of students posted. Students can register themselves by code number.

To acquire maps check with the administration to see whether the district has a large readable map of the school surroundings or get a gas station map and turn it into an overhead for enlargement.

STUDENT ROLES

Cartographer
Wayfinder

MATERIALS

large map of the school and the region in which children live
personal map of the school and home region
location flags on pins
Student Page 1.7.3 HOME

BEST COPY AVAILABLE

PRODUCTS

Completed class map
Locate home and route to school on personal maps
Completed Student Pages

PROCEDURES

1. **In preparation for the activity, send Student Page 1.7.3 HOME to parents outlining the activity and asking that they help their children record the information.**

2. **Show students the large class map and say that we want to find where all the students in the class live.**

    - Use an overhead of the map.

    - Show the school and how to locate it.

    - Have students try to find their homes. Help only as needed.

3. **Have students working in groups with their personal maps to find where they live.**

    Ask such questions as these:
    - Where is the school?

    - Where is the north side of the school on the map?

    - Are there ways of telling the northern direction of our map? Look for compass directions in the key.

    - Do you live on the west side of the school? On the east side? On the south side? On the north side?

    - Can you find the street on which you live?

    When students have located their homes, have them put location pins on the large map with their names attached.

4. **Have students find their usual route home from school on their personal maps.**

   Ask such questions as these:
   - Can you find the name of the street by which you leave school?
   - Can you follow it to the next street you go to?
   - Which way do you turn?
     ✔ Left or right, north, south, east, or west?

   Have students mark their route in pencil on their map.

5. **Discuss safety for going to and from school with students. See Activity 1.6.8 SAFETY RULES.**

6. **Have students observe and collect additional information on their maps, once they know their route to school.**

   On successive days have them
   - Check their mapped route.
   - Find out which of the streets that they cross have stoplights.
   - Find which streets have stop signs. Record on both maps.
   - Find children's Neighborhood Watch homes. Record on both maps.

EXTENSIONS

- Play street direction games. These can be put in the learning center.
- Give a starting point, followed by street names and left-right directions. Have students tell what is at the end of the trail.
- Give a starting point, followed by street names and north-south-east-west direction. Have students tell what is at the end of the trail.
- Review and practice reciting phone numbers.
- Discuss telephone etiquette.

1.7.4 MAP DISTANCE

OBJECTIVES

The students
- Use their maps to measure distances between various points.
- Use both the English and metric systems.

BACKGROUND

This activity has two parts. In part one, students use the map produced in Activity 1.10.2 OUTDOOR STUDY AREA MAPPING to practice measuring the dimensions of their OSA plot. Their predictions can be tested by remeasuring the plot. In part two, students use their personal neighborhood maps to determine distances along the route they travel.

Two things need to be done in preparation for the activity. First, cover student maps with plastic wrap or a clear sheet of plastic. Second, make a scale which reads in both English and metric units for the map.

Students can use wet cotton string placed on the plastic to measure distances not in straight lines. In all physical measurement use approximate language such as "about 5 meters" rather than "5 meters," and certainly never "exactly 5 meters." Imprecision is inherent in all measurement.

STUDENT ROLES

Cartographer
Wayfinder

BEST COPY AVAILABLE

MATERIALS

OSA maps
overhead projection of OSA
personal maps covered with plastic
overhead projection of a personal map
map scales in English and metric
soft cotton string
water
Student Page 1.7.4 MAP DISTANCE

PRODUCTS

Complete Student Pages

PROCEDURES

1. **Introduce the problem of finding how far apart things are using maps by showing an overhead projection of the OSA on the screen.**

   Ask such questions as these:
   - What does the plot map tell us?
     ✔ Work for the idea that maps tell us how big the plot is.
   - How long is your plot?
   - How can you tell how long your plot is from the map?

2. **Have students make a scale on the bottom of their OSA plot map.**

   - Mark four or ten blocks as a scale depending on the size of quadrate paper used.
   - Mark how many meters (four, ten) blocks represent.
   - Mark how many yards (four, ten) blocks represent.
   - Point out that the scale is like a little "measuring stick."
   - Use a string to show that the length of the scale is the same (four, ten) blocks along the side and top of the map.

Ask such questions as these:

- How wide is your plot?
- How can you tell how wide your plot is?
- How far is the plot from corner to corner (a diagonal)?

Have students use their meter-string cans to remeasure their OSA plots and verify the dimensions on their maps.

3. **Introduce the neighborhood map with an overhead projection on the screen.**

   - Show students the use of the plastic-covered personal neighborhood maps.
   - Hand out a scale, reminding them that the scale is like a little measuring stick.
   - Have students wet their string so it will stick to the plastic.

4. **Have students work in groups to measure distances on the neighborhood map.**

   - Select a long, straight road on the map and have students measure its length with the string and tell the distance in miles and kilometers using the scale.
   - Select different routes on the map both straight and non-straight and tell their length in miles and kilometers. Be sure all groups understand how the wet string can be made to conform to the map, so that when straightened out it will give a total distance measurement.
   - Have students measure the distance between school and home and record it on Student Page 1.7.4 MAP DISTANCE.

EXTENSIONS

Put map puzzles in the science activity center.

- Type 1. Single-path maps of different shapes, combinations of curved and straight lines. Ask how far it is between points. Have wet string and scales available.

- Type 2. City maps in which students are to find the shortest distance between points A and B following streets.

1.7.5 MAKING A BOAT

OBJECTIVES

The students
- Practice volumetric measurement.
- Observe that 2 pints (1/2 liter) make a quart (liter).
- Observe that 4 half-pints (1/4 liter) make a quart (liter).
- Invent a boat that will carry a large load before sinking.
- Invent a boat that will travel quickly under wind propulsion.

BACKGROUND

Students invent and build their boats for the great regatta in this activity. They can work singly or in pairs.

There are two goals in the regatta. The first goal is to produce the fastest boat to go from one end of the lake to the other using wind propulsion. See Student Page 1.7.7B WIND AND BOATS. The second goal is to produce a boat that carries the greatest mass. See Activity 1.7.8 FLOATING AND SINKING.

Give students a choice of hull-building materials having the same approximate volume to increase their understanding of the concept of volume. For example, they could be given one 1-quart carton (1 liter), two 1-pint cartons (1 liter) or four half-pint cartons (1 liter). Students demonstrate that each combination holds approximately one quart (1 liter) of water. Milk cartons work well because they are waxed so are not likely to lose their shape from water logging.

The boats will need sails and rudders or other steering devices. If needed, show students examples of boats, but don't analyze their performances.

Every boat should win some sort of award. Some possibilities are

Grand prizes:
- Boat that was the fastest
- Boat that carried the most sand before sinking

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Other prizes:
- Boat with the tallest sail that does not tip over
- Boat that sailed the straightest course
- Boat made of the most pieces
- Boat made of the fewest pieces
- Boat that has the fanciest decorations
- Boat that is the prettiest
- Boat that measures the longest from end to end
- Boat that does the most tricks
- Boat that measures the shortest from end to end
- Boat that is the widest
- Boat that is the funniest
- Boat that won the most races

And other prizes invented by teacher or students. Often the boats themselves will suggest special award ideas.

STUDENT ROLES

Inventor
Boat builder

MATERIALS

Inventor's Box
milk cartons (quart, pint, 1/2 pint)
stick (barbeque)
spools
string
thread
foil
tape
glue
scissors
staplers
pans of water for testing boats
Student Pages 1.7.5A MEASURING VOLUME
1.7.5B MAKING A BOAT

PRODUCTS

Regatta boats
Completed Student Pages

PROCEDURES

1. **Announce to students that the great regatta and they are to build a boat that will carry as much sand as possible before sinking and will sail fast when pushed by wind.**

   Describe the lake and the regatta rules. Show one or two examples of boats.

2. **Begin by having students explore which hull options have equal volumes. Each group will have a hull made of cartons with a carrying capacity of one liter.**

   Pour water from quart-liter cartons into pint-1/2 liter cartons and 1/2 pint-1/4 liter cartons.

   Have student groups invent their own way to determine
   - How many pints (1/2 liters) make a quart (liter)?
   - How many 1/2 pints (1/4 liters) make a pint (1/2 liter)?
   - How many 1/2 pints (1/4 liters) make a quart (liter)?
   - What combination of cartons holds the same amount of water as a quart (liter) carton?

   Use Student Page 1.7.5A MEASURING VOLUME.

3. **Have students select materials from the Inventor's Box and build their boats.**

   Have students explain their reason for their selection of hull materials.

4. **Have students test their boats.**

   Ask questions such as these:
   - Does your boat stay upright in water?
   - Does your boat have a sail?
   - Do parts of your boat absorb water?
   - What happens to your boat when it absorbs water?

Students should be encouraged to modify their designs until they are satisfied. This is an important part of the invention process.

Have students record their designs on Student Page 1.7.5B MAKING A BOAT.

1.7.6 MAKING A LAKE

OBJECTIVES

The students
- Make a lake.
- Invent a way to confine and control water.

BACKGROUND

In this activity students make the lake for the great regatta.

The lake can be constructed indoors on any level surface (the floor, on a bench, table top, etc.). Outside, the lake can be located anyplace that is flat (playing field, driveway, sidewalk, lawn, etc.), or anyplace that can be shaped into a container (sandbox, garden, etc.). The lake needs to be reasonably leakproof. Use a plastic lining. Plastic linings can be invented by students. See Activity 1.10.9 BUILDING WITH AIR.

The size of a lake is generally determined by its location. Large lakes require more effort to make and drain. A lake 1 meter (3 ft) X 2 meters (6 ft) X 10 cm (4 in) deep will give plenty of space for the regatta. More than one lake can be constructed as needed. Construct the lake before the great regatta to give students time to test their boats.

STUDENT ROLE

Hydrology engineer

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MATERIALS

heavy-weight, plastic painter's dropcloth, plastic shower curtain, or plastic bags
scissors
iron
newspaper
cardboard
boards: two 2" X 6" or 2" X 8", 1 meter (3 ft) long
or two 2" X 6" or 2" X 8", 2 meters (6 ft) long
hose
buckets
mops
Student Page 1.7.6 REGATTA LAKE

PRODUCTS

The regatta lake
Completed Student Pages

PROCEDURES

1. **Introduce the need for a lake that is at least 2 meters long and 1 meter wide for the great regatta.**

   Ask such questions as these:
   - Where could we construct such a lake? Indoors? Outdoors?
   - Why would we want to construct it? Indoors? Outdoors?
   - If indoors, should the lake be on or off the floor?
   - If indoors, where could we build a lake or lakes of this size? ✔ If class floor plans have been made, they can be used in planning. See Activity 1.10.10 FLOOR PLAN.
   - What could we use to make a lake that won't leak?
   - How can we make the lake?
   - What materials do we need?
   - How can we fill our lake?

2. **Decide on a location and have students design and construct the lake.**

   The Student Page 1.7.6 REGATTA LAKE can be used to get student groups thinking about the design and construction of the lake.

1.7.7 THE GREAT REGATTA

OBJECTIVES

The students
- Develop race rules.
- Practice measuring time.
- Race a boat.
- Relate speed and the straightness of the boat course.
- Relate speed and the shape of the boat.

BACKGROUND

In this activity the races are run in the great regatta.

The rules are developed by students and adjusted as necessary during the regatta. Set rules as to how the boat course can be adjusted (can students touch, push away from sides, etc.).

Use a fan as a wind source. Adjust the distance of the fan from the lake before the regatta. Most boats will not sail a straight course.

For each race there should be a timing team. Where timing is found difficult, match races may be used. Ideally, both matched and timed races can be used. Timers will need practice in measuring and recording time. Wherever possible, students should use their own timepieces. See Activity 1.2.11 MAKING A CLOCK. The most accurate timing mechanism will probably be a continuous fall of water drops hitting a pie pan. Students often get so wrapped up in the contest that they will forget to count. You may want to use a stopwatch as a back-up.

STUDENT ROLES

Sailor
Judge
Timer
Spectator

MATERIALS

chart paper
markers
student timing device
stopwatch
student boats
lake
Student Page 1.7.7A RACE TIMES
1.7.7B WIND AND BOATS

PRODUCTS

Race rules
Completed Student Pages

PROCEDURES

1. **Have students decide on how time will be measured. Measure the time for several practice races. Use Student Page 1.7.7 RACE TIMES for recording times.**

   Some suggested questions are
   - How long did the race take?
   - Do all timers agree?
   - What time do most of the timers have?
   - What time should we use?

2. **Have the class decide on the rules for the great regatta after running several practice races.**

   Ask such questions as these:
   - How should the boats line up at the start?
   - What will we do when two boats run into each other?
   - What will we do when a boat runs into the side of the lake?
   - How many boats will we race at a time?
   - What must a boat do to win the race?

- Who will decide which boat has won?

Record the rules on chart paper.

3. **Organize timing, judging, and any other teams as suggested by the students.**

   Students should change roles with each race.

4. **Let the races begin. Hold the great regatta.**

   Parents, other classes, etc., can be invited to watch.

5. **After the regatta, summarize and discuss the results.**

   Ask such questions as these:

   - What do we mean when we say one boat is faster than another boat?
   - How was the fastest boat different from the slower boats?
   - What do you think made it faster?
   - How were the straight-sailing boats different from the twisted- course boats?
   - What do you think made them sail straighter?
   - Did the straightness of the path of the boat affect how fast a boat traveled the course?
   - How would you make a boat out of the same materials that would perform better next time? Make a drawing on Student Page 1.7.7B.

1.7.8 FLOATING AND SINKING

OBJECTIVES

The students
- Practice measuring mass.
- Determine how much mass it takes to sink a boat.
- Relate the amount of mass carried to the structural differences of boats.

BACKGROUND

After the sailing races (1.7.7 THE GREAT REGATTA), the boats are tested to determine how much mass they can hold before sinking. The new problem is measuring the mass of sand added to each boat to sink it. Use moist sand so that it can be positioned in the bottom of the boat. Sand is relatively easy to clean out of waxed cardboard boats so the boats can be reused.

The concept of conservation of mass is embedded in this problem and will be difficult for some students to understand. Have students work with the mass of sand divided into two separate piles that are weighed to demonstrate the parts equal the whole.

There are several ways to do the mass measurement.

Method 1. Use a balance or scale.
Step 1. Measure out a mass of moist sand that is greater than that needed to sink any one boat. A half-liter (pint) of wet sand will usually be enough.
Step 2. Measure the mass of the moist sand and record.
Step 3. Add just enough moist sand to the boat to sink it.
Step 4. Measure the mass of the remaining sand. The winner has the smallest remaining mass.

Method 2. Use a simple equal-arm balance without mass measurement.
Step 1. Use small containers with equal mass. 10-ml plastic medical dose cups work well.
Step 2. Fill one dose cup with moist sand. This becomes a standard.

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Step 3. Fill other cups with equal amounts of sand.
Step 4. Pour measured quantities into the boat, counting the number of cups. The one holding the largest number of cups wins.

Some boats will take a whole number of cups plus a fraction of a cup. The unused part of the standard mass can be kept, and if two boats take on the same whole number, the fractions can be compared on the balance. The logic used in Method 1 will again pertain, so the boat with the smallest left-over fraction will win. The larger part of the fraction will have gone to sink the boat.

Method 3. Use a simple equal-arm balance and record the mass. The steps of this procedure are the same as Method 2 above, with the addition of recording of mass.

If a balance is not available, the teacher can make one, using a rigid ruler, paper clips, string, and 2 identical cups.

STUDENT ROLE

Weigh master

MATERIALS

balance or digital scale
moist sand
containers
Student Pages 1.7.8A MEASURING MASS
1.7.8B FLOATING AND SINKING

PRODUCTS

Completed Student Pages

PROCEDURES

1. **Before the contest, have students practice measuring mass using one of the sequences described in the background.**

If Method 1, ask such questions as these:

- How do we know the mass of sand we put in the boat?
- How much sand did we have at the start?
- How much sand did we have left over?

- How do we find how much sand we put in the boat?

If Method 2 and 3 are used, ask such questions as these:

- How much sand did we put in the boat in each cup?
- How much did we put in altogether?
- How much sand did we have left over from the last cup?
- How can we compare the amount left over?

3. **Run the contest.**

Use Student Page 1.7.8A MEASURING MASS to record mass measurements.

4. **After the contest discuss the results with the class.**

Some suggested questions are

- Which boat took the most sand to sink?
- How was it different from the ones that took less sand to sink?
- What do you think allowed that boat to carry so much sand?
- What would you do next time to carry more mass? Have students draw a picture on Student Page 1.7.8B FLOATING AND SINKING.

DASH 1.7.9 DRAINING A LAKE

OBJECTIVES

The students

- Invent one or more ways of emptying a container of a measured amount of water.
- Determine the time necessary to empty a container of water.
- Practice measuring volume and time.

BACKGROUND

This activity continues the contests developed in the great regatta. Groups of students invent ways to remove water from a large container.

Several contests can be arranged such as one for emptying with dipping devices or one for emptying with any kind of device. Run each contest for a fixed period of time. One minute is a good time length for a contest.

The water removed is measured to see who has removed the most. Contest tanks can be made in cardboard boxes lined with plastic bags. Fill tanks with about 10 liters (2 1/2 gal) of water.

To ensure constant class participation, two to three groups of 3–4 students should compete at a time. The contest will need a timing team, volume-measuring teams, and a mop-up team.

Before running the contest, the students invent a unit of volume to measure water. This might be a jarful, a canful, or whatever. Calibrate pails, using a waterproof marking pen. Mark the level of each jar, can, or whatever units of water are added.

STUDENT ROLE

Hydraulic engineer

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MATERIALS

lakes (See Activity 1.7.6 MAKING A LAKE) or, cardboard box and plastic bag tanks
liter graduated containers
jars
cans
pails
water source
rags
waterproof pens
tape
mops
drawing paper
Student Page 1.7.9 LAKE CONTEST

PRODUCTS

Invented lake-emptying devices
Completed Student Pages

PROCEDURES

1. **Have students invent methods and set up the contest rules for emptying the lake or tank. Record rules on chart paper.**

   - Invent ways to empty the lake or tank and practice using them.
   - Invent a standard unit of measurement of water volume.
   - Invent and make devices to measure the water emptied from the lake or tank.
   - Standardize one device against another.

2. **On the day of the contest, have teams fill their lake or tank with a measured amount of water. Then run each contest as described in the background.**

3. **Discuss the contest with the students.**

   Ask such questions as these:
   - Which of the ways that we have invented worked the best?
     ✔ Which team emptied the lake the fastest?

   - Why did they empty it the quickest?

- Which of the ways was the easiest?
- What made it the easiest?
- Can you invent a way that would work better than any tried yet? If so, draw and label a picture of it.

EXTENSION

- Empty the regatta lake using the technique developed in the contest.

SP 1.7.1

DASH

DISTANCE AND COUNTING
SP 1.7.1

Name: ____________________

Date: ____________________

10 meters = ______________ steps

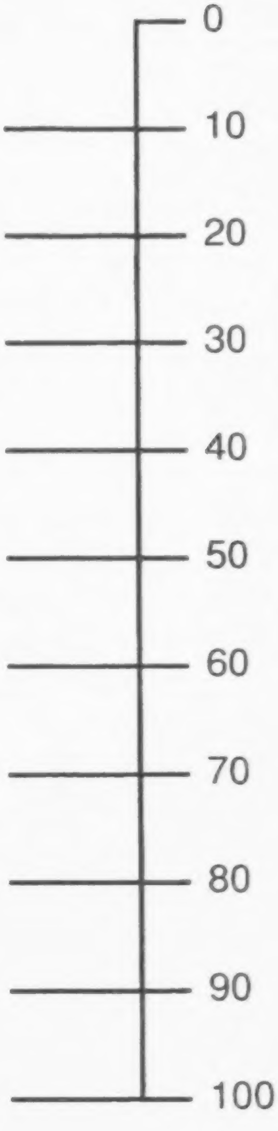
METERS	PREDICTION	STEPS TAKEN
10		
20		
30		
40		
50		
60		
70		

PACING

FROM	TO	PREDICTION	STEPS	METERS

PACING NUMBER LINE

STEPS METERS


0
10
20
30
40
50
60
70
80
90
100

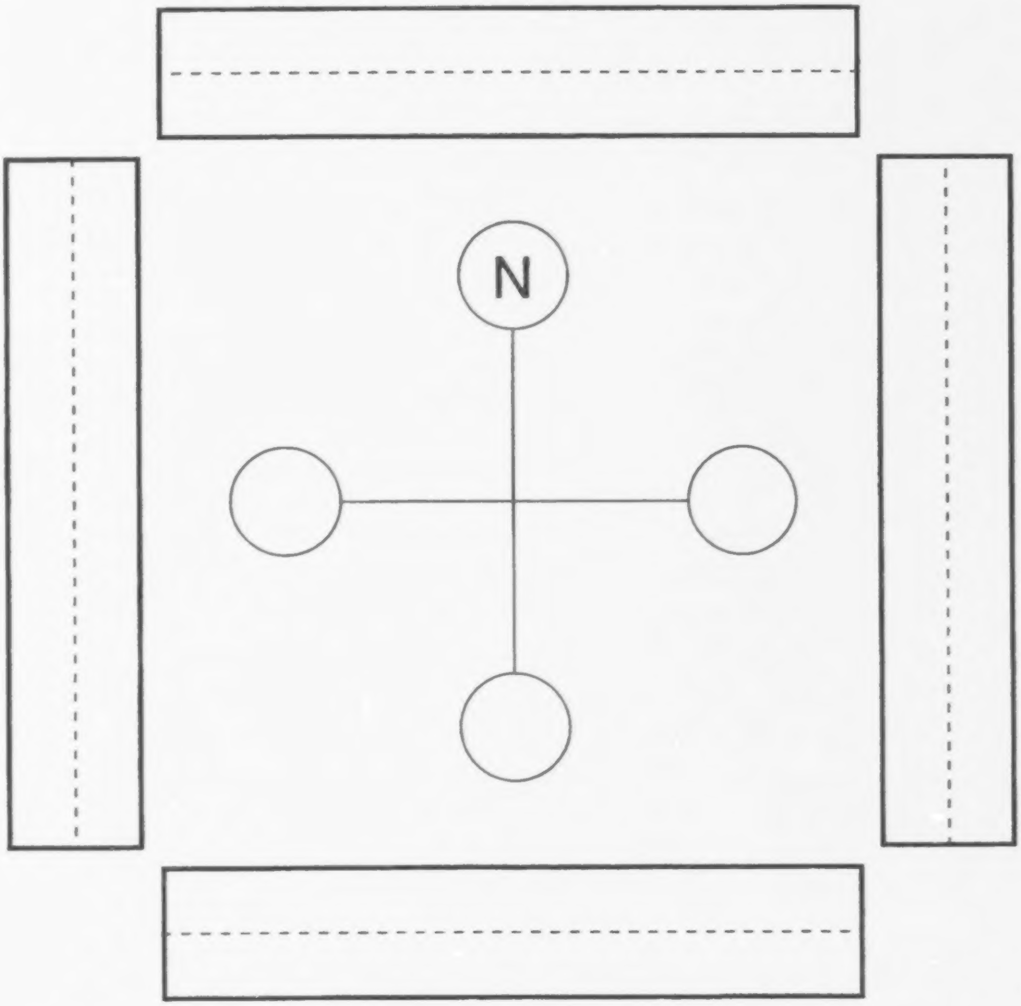
DASH

NORTH, SOUTH, EAST AND WEST SP 1.7.2

Name: ____________________

Date: ____________________

Fill in the compass direction. Label the locations of the markers.



DASH

HOME
SP 1.7.3

Name: ______________________

Date: ______________________

Dear Parents:

We are studying directions and wayfinding in school. We need your help with some of our lessons. We are learning our own address and phone number. We will also be learning about maps. To do this we will be finding our way to and from school on maps. Please help us fill out the information below.

Thank you.

If you do NOT want your address pasted on a class map please initial here: ☐

Name: ______________________

Address: ______________________

____

Phone: ______________________

Draw and label a map of your child's route from school to home.

MAP DISTANCE
SP 1.7.4

Name: ______________________

Date: ______________________

FROM WHERE	TO WHERE	DISTANCE (miles)	DISTANCE (km)

SP 1.7.5A

DASH

MEASURING VOLUME
SP 1.7.5A

Name: ______________________

Date: ______________________

Fill in the boxes.

☐ pints/ 1/2 liters = 1 quart/liter

☐ 1/2 pints/ 1/4 liters = 1 pint/ 1/2 liter

☐ 1/2 pints/ 1/4 liters = 1 quart/liter

Find four ways to fill up a one-liter container using quart/liters, pint/ 1/2 liter, and 1/2 pint/ 1/4 liter containers.

= 1 liter

= 1 liter

= 1 liter

= 1 liter

DASH

MAKING A BOAT SP 1.7.5B

Name: ______________________

Date: ______________________

Draw and label a picture of your boat

REGATTA LAKE
SP 1.7.6

Name: ____________________

Date: ____________________

Write or draw your ideas for building a lake for THE GREAT REGATTA.

Where?

How?

DASH

RACE TIMES
SP 1.7.7A

Name: ______________________

Date: ______________________

BOAT OWNER	TIME

WIND AND BOATS
SP 1.7.7B

Name: ____________________

Date: ____________________

Draw and label your ideas for building a faster boat.

DASH

MEASURING MASS
SP 1.7.8A

Name: ______________________

Date: ______________________

Boat owner	How much sand left over?	How much sand to sink the boat?

DASH

FLOATING AND SINKING
SP 1.7.8B

Name: ______________________

Date: ______________________

Draw and label your ideas for building a boat to carry lots of mass.

SP 1.7.9

DASH

LAKE CONTEST
SP 1.7.9

Name: ______________________

Date: ______________________

TEAM	HOW MUCH WATER?

DASH

GRADE ONE
CLUSTER 8

ENERGY AND COMMUNICATION

1.8.1 Temperature of Things
1.8.2 The Master Thermometer
1.8.3 Hot and Cold
1.8.4 Sources of Energy

1.8.1 TEMPERATURE OF THINGS

OBJECTIVES

The students
- Discover that temperature is a major variable in the environment.
- Discover that there is a comfort range for temperature.
- Associate temperature differences with seasons, shadow, and light.
- Discover that it takes different kinds of thermometers to measure different ranges of temperature.
- Create a working definition for temperature.

BACKGROUND

This is a long-term activity that begins with the collection of temperature data which are recorded on the class calendar. After completing Activity 1.2.9 THE SUN students should be encouraged to take and record temperatures whenever they find a place or a thing with unknown temperature conditions.

This activity will require several different kinds of thermometers:
- Narrow-range thermometers to measure the body temperature of humans and animals.
- Wide-range environmental thermometers.
- High-range cooking thermometers.

Groups of 2–4 students are assigned to each category of measurements. Assign a group when a new kind of measurement is needed. Individuals may also want to have their own temperature-measuring projects.

Group assignments can include finding temperatures of well and sick people, outside still air, outside moving air, room temperatures, cooking temperatures, outside precipitation, outside soil temperature, etc.

Problems concerning Fahrenheit and Celsius can be solved by using thermometers with both scales side by side. Otherwise, the conversion formulas are

$$T_C = 5/9\,(T_F - 32^\circ)$$
$$T_F = 9/5T_C + 32^\circ$$

Temperatures of people can be taken under the arm, orally if disposable sleeves are used, or on the skin using a liquid crystal thermometer.

Problems concerning temperatures below zero should not be intellectualized at this time. A temperature below zero should be treated as just another point on the scale. We simply count both ways from zero. We are laying the groundwork for a wide variety of quantitative scales that involve a zero point, for example, dates (BC–AD), bank balances, etc.

CAUTION: A permission system should be established for measuring high- and low-range temperatures. Parental help may be used.

STUDENT ROLE

Scientist

MATERIALS

The Learning Calendar
1–4 thermometers –10° to 110°C
1–4 oral-range thermometers
1–2 high-range oven thermometers
chart paper
markers
Student Page 1.8.1 TEMPERATURE OF THINGS

PRODUCT

Completed Student Pages

PROCEDURES

1. **Review the care, the holding, and reading of a thermometer when The Learning Calendar is started.**

   Some suggested questions are
   - What temperature information did you keep last year?
   - What did you learn about temperature?

- Did temperature change from day to day?
- How did you measure temperature?
- Where did you take temperatures?

2. **Suggest to students that we want to find out all we can about the temperatures of things.**

   Begin with the calendar and record temperature changes during the day.

   Ask such questions as these:
   - Where should we take temperatures and why?
   - When should we take temperatures?

3. **After Activity 1.2.9 THE SUN, have students begin taking other kinds of temperatures and record their data on Student Page 1.8.1 TEMPERATURE OF THINGS or a class chart.**

   Ask such questions as these:
   - Are there other things you would like to know about temperature changes?
   - What kind of records should we keep? Standardize a report form (date, time, conditions, name of reporter, etc.).

4. **Assign a temperature team whenever a new temperature-measuring event occurs.**

5. **Have students create a working definition of temperature about mid-year and record it in the Working Dictionary.**

   Some examples of working definitions include the following:
   - Temperature is a measure of how hot or cold something is.
   - Temperature is what we measure on a thermometer.

1.8.2 THE MASTER THERMOMETER

OBJECTIVES

The students
- Observe that many events are associated with change in temperature.
- Observe that seasons are associated with temperature changes.
- Set up their own inquiries into temperature.
- Compare temperatures that characterize different kinds of events.
- Make a concrete representation of temperatures collected during the year.

BACKGROUND

This activity is the summarizing activity for a year of temperature record keeping. It should be done during the last few weeks of school.

Students build a model thermometer. The model should cover the full range of temperatures recorded during the year and have equal intervals. Students put together onto one thermometer all the information taken with different thermometers. Both Fahrenheit and Celsius scales may be used.

At this point students often discover that a meter stick has 100 divisions or centimeters. A thermometer two and one-half meters long will give 250 one-degree Celsius readings using 1 cm as 1°C. This is equivalent to 450 one-degree Fahrenheit readings. This should encompass the range of temperature data collected by the students.

Some magic numbers may help students keep track of the two temperature scales:

–40° Celsius = –40° Fahrenheit
28° Celsius = 82° Fahrenheit

STUDENT ROLE

Scientist

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MATERIALS

The Learning Calendar
student temperature records from Activity 1.8.1 TEMPERATURE OF THINGS
oak tag
grid paper (cm)
scissors
glue
marking pens
Student Page 1.8.2 THE MASTER THERMOMETER

PRODUCTS

Master thermometer
Completed Student Pages

PROCEDURES

1. **Have students plan to make a large class thermometer to record temperatures they have collected.**

   Ask such questions as these:
   - What is the hottest Celsius temperature we want to put on our thermometer? What would that be in Fahrenheit?
   - What is the coldest Celsius temperature we want to put on our thermometer? What would that be in Fahrenheit?
   - How many degrees will our Celsius scale show?
   - How many degrees above zero?
   - How many degrees below zero?
   - How are we going to make such a big thermometer?
   - What materials will we need?

2. **Build parts of the thermometer in student groups.**

   One suggested procedure is
   - Use cardboard or oak tag for the backing. The final piece should measure about 275 cm X 30 cm or 110 in X 12 in.

- Cut centimeter grid or graph paper into strips 2 cm wide. Glue them together to make a strip about 260 cm long.
- Glue the strip to the backing with a circle at the bottom to represent the bulb. Make the circle 6–8 cm in diameter.
- Label °C on the thermometer. Each cm = 1°C. Use the range –50°C to 200°C.
- Equivalent °F can be added as the students record their temperature information on The Master Thermometer.

3. **Student groups record temperature information on The Master Thermometer.**

4. **Have students make a smaller model of The Master Thermometer using Student Page 1.8.2 THE MASTER THERMOMETER.**

- Cut out the thermometer from the student page.
- Glue it to a large (12 in X 18 in) sheet of oak tag or construction paper.
- Have students record temperatures they have collected.

5. **Discuss and summarize the activity with the students.**

Some suggested questions are
- What are the highest daytime temperatures? The lowest?
- What was the highest fall temperature? The lowest?
- What was the highest winter temperatures? The lowest?
- What was the highest spring temperatures? The lowest?
- What was the usual temperature in the fall? The winter? The spring?
- Compare fall, winter, and spring temperatures. Are there differences? How do they differ?
- What was the highest temperature we measured? What produced that temperature?

- What was the lowest temperature we measured? What produced that temperature?
- What was the lowest human temperature we measured? What was the highest human temperature we measured?
- Were people with the low and high temperature well or sick?

Continue to ask questions to connect the information with other events and situations.

1.8.3 HOT AND COLD

OBJECTIVES

The students
- Identify things that feel hot and cold.
- Identify various ways of heating and cooling things.

BACKGROUND

In this activity students relate temperature to the sense of hotness and coldness. They invent ways of making water warmer and colder.

STUDENT ROLE

Researcher

MATERIALS

thermometers
jars
coffee maker
fan
ice
hot water
Student Page 1.8.3 HOT AND COLD

PRODUCT

Completed Student Pages

PROCEDURES

1. **Introduce the problem of how to make things hot and cold by presenting several samples of water at different temperatures.**

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Ask such questions as these:
- Is this water hot or cold?
- What temperature do you think the water is?
- When does something feel hot?
- When does something feel cold?
- When does something feel neither hot or cold?

2. **Have students take temperatures and get a consensus on what is hot and what is cold.**

   Record the information on Student Page 1.8.2 HOT AND COLD.

3. **Have students invent as many different ways as they can to raise and lower temperatures of water.**

   Start with water at
   - Room temperature
   - 40–50°C (warm)
   - 10–15°C (cold)

   Use the Inventor's Box to suggest ideas as needed.

4. **Discuss and summarize the activity.**

   Some suggested questions are
   - What was the temperature of water that felt neither hot or cold?
   - What was the temperature when water began to feel warm?
   - What was the temperatures when water began to feel cool?
   - How did you make cool water hotter?
   - How did you make warm water colder?
   - What other ways can we make things hot?
   - What other ways can we make things cold?

1.8.4 SOURCES OF ENERGY

OBJECTIVES

The students
- Identify things that are energy sources.
- Use a mnemonic device to identify energy sources.

BACKGROUND

This activity is designed to have students create a list of things that are sources of heat energy. Because heat is easily sensed as warmth, we start the work using the definition that ENERGY IS HEAT OR ANYTHING THAT CAN BE TRANSFORMED (CHANGED) INTO HEAT.

Energy is a forgiving area of inquiry. All objects possess energy and under certain circumstances can be an energy source to another object. Different forms of energy are themselves considered to be sources of energy. Some examples are light, heat, magnetism, radiation, atomic energy, gravity, electricity, sound, currents, and molecular bonds. Objects that possess different forms of energy are also sources of energy. Some examples include fuels, heat machines, batteries, moving objects, sound producers, and living things.

The activity begins with The Sources of Energy Song. The song has several parts:
- The Definition and Question
- Student (example of successful response)
- Leader (affirmation of successful response)
- Student (example of an incomplete response)
- Leader (further probing of an incomplete response)
- Student (example of additional response after probing)
- Leader (affirmation of successful response)
- Leader Ending

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THE SOURCES OF ENERGY SONG

The Definition and Question
Energy sources can make things hot.
Can make things hot, can make things hot.
Energy sources can make things hot
What energy source have you got?

Student (successful response)
Fire's a source that can make things hot.
Can make things hot, can make things hot.
Fire's a source that can make things hot
Is it not, is it not? Is it not?

Leader (affirmation of successful response)
Fire is a source just as you thought,
Just as you thought, just as you thought.
Another energy source, what have you got?

Student (example of an incomplete response)
A rock is a source that can make things hot
Can make things hot, can make things hot.
A rock is a source, that's what I've got.
Is it not, is it not, is it not?

Leader (further probing of an incomplete response)
How can a rock make things hot,
Make things hot, make thing shot?
How can a rock make things hot?
What's your thought, what's your thought, what's your thought?

Student (example of additional response after probing)
A falling rock can make things hot
Make things hot, make things hot
A falling rock's a source, that's what I've got
Is it not, is it not, is it not?

Leader (affirming)
A falling rock's a source just as you thought,
Just as you thought, just as you thought.
A falling rock's a source just as you thought.
Another energy source, what have you got?

Leader (ending)
Go think about energy, go think a lot,
Got think a lot, go think a lot.
Go think about energy, go think a lot,
And tomorrow we'll see just what we've got.

STUDENT ROLES

Scientist
Chanter/Musician/Singer

MATERIALS

Student Page 1.8.4 SOURCES OF ENERGY

PRODUCTS

New verses to the song
Class List Energy Sources
Completed Student Pages

PROCEDURES

1. **Use the energy song or chant to ask questions and get student responses about sources of energy.**

2. **Make a Class List Energy Sources on chart paper.**

   Use Student Page 1.8.4 SOURCES OF ENERGY to help students develop their ideas.

3. **Discuss and summarize the activity.**

   Ask such questions as these:
   - Which sources make things the hottest?
   - Which energy sources that we have listed do people have to pay money for?
   - How do we use these kinds of energy sources that we have to pay for?
   - Which kinds of energy sources that we have listed are free?

DASH

TEMPERATURES OF THINGS
1.8.1

Name: ______________________

Date: ______________________

WHO?						
°F						
°C						
WHERE?						
TIME						
DATE						

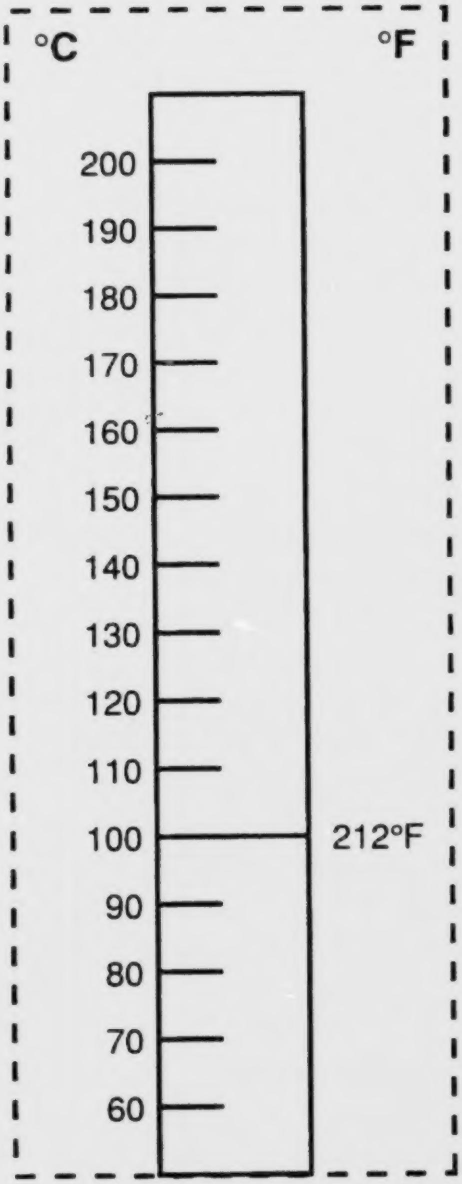
SP 1.8.2

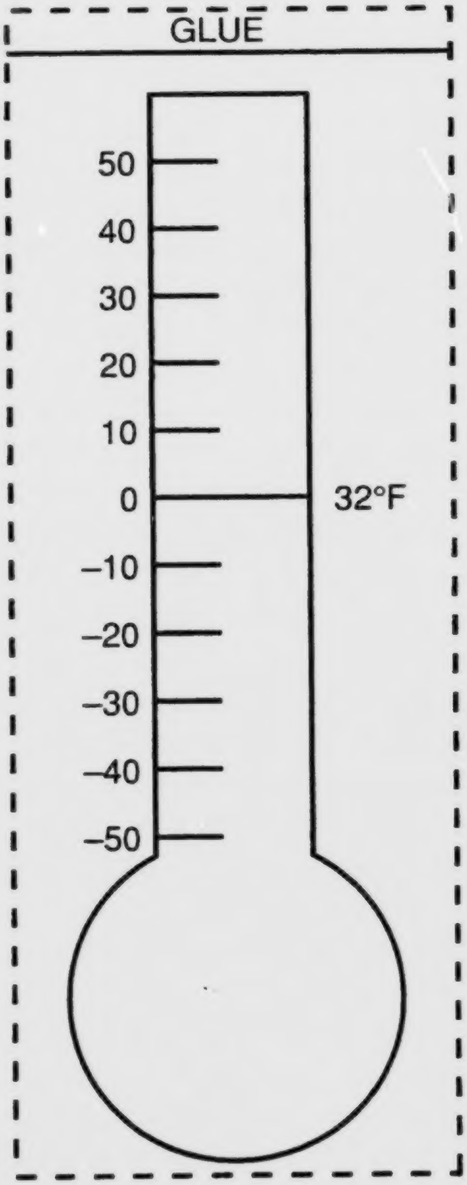
DASH

THE MASTER THERMOMETER
1.8.2

Name: ______________________

Date: ______________________


°C
°F
200
190
180
170
160
150
140
130
120
110
100
212°F
90
80
70
60


GLUE
50
40
30
20
10
0
32°F
–10
–20
–30
–40
–50

DASH

HOT AND COLD
1.8.3

Name: ____________________

Date: ____________________

Write the temperature for		
Hot water	Cold water	Neither hot or cold water

Draw a picture of how you made water hotter.	Draw a picture of how you made water colder.

SP 1.8.4

DASH

SOURCES OF ENERGY
1.8.4

Name: ____________________

Date: ____________________

Think of some energy sources. Show how they might make things hot.

DASH

GRADE ONE
CLUSTER 9

Conservation, Recycling, and Decomposition

1.9.1 Conserving Classroom Resource
1.9.2 Conserving Energy
1.9.3 Conserving Water
1.9.4 Decomposition and Unearthing
1.9.5 Decomposition and Reburial
1.9.6 Recycling

1.9.1 CONSERVING CLASSROOM RESOURCES

OBJECTIVES

The students
- Observe why resources need to be conserved.
- Invent and build storage containers for conserved materials.
- Make use of recycled materials.

BACKGROUND

This activity continues the ongoing theme of conservation of resources. Emphasized is the idea that good technology uses as few resources as possible and recycles its wastes for other uses. Conservation is an attitude as well as an act of saving things that are useful. It must be regularly practiced by students and teachers. Conservation is a life-long activity.

Introduce conservation during an activity in which students are being wasteful of resources such as paper, glue, etc., or when students find items such as Styrofoam cups, milk cartons, etc., that can be reused for construction.

STUDENT ROLE

Conservator

MATERIALS

chart paper
cardboard
scissors
glue
markers
Student Page 1.9.1 CONSERVING CLASSROOM RESOURCES

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PRODUCTS

Storage containers
Class chart conservation list
Completed Student Pages

PROCEDURES

1. **Introduce students to the need for saving unused supplies and materials.**

   Ask such questions as these:
   - What do we have left over that we might use later?
   - How might we use it?
   - How can we store it?
   - Where can we store it?

2. **Have students make the Class chart conservation list.**

   Include
   - The item saved.
   - Where the storage container is kept.
   - Which group is responsible for each material.
   - A list of uses for the saved materials.

3. **Assign student conservator groups to be responsible for collecting and storing different kinds of materials.**

   Have each group
   - Invent and build a storage container for the material assigned.
   - Label the container.
   - Decide where to store it.
   - Watch for ways that their conserved materials can be used in later projects.
   - Add the information to the conservation list.

- Remind the class when conserved material should be used instead of new materials.

- Use Student Page 1.9.1 to record group data.

4. Have students plan for the conservation of recycled materials the class might need in the future.

- List some of the things that will be needed during the year.

- Have students bring these items to school
  ✔ Baby food jars, coffee cans, Styrofoam cups, etc.

- Assign a conservator group for the different items as done in Procedure 3.

5. Discuss the reasons for conservation.

Ask such questions as these:
- Why should we conserve our classroom resources?

- Why should we carefully store things we have conserved?

- Can you think of examples of conservation outside school?

1.9.2 CONSERVING ENERGY

OBJECTIVES

The students
- Practice conservation of electrical energy.
- Practice conservation of heat energy.
- Relate saving energy to saving money.
- Use electricity wisely.

BACKGROUND

This activity is designed to be used whenever it is possible to give examples of conservation of energy.

This is the first systematic look at conservation of energy. It deals with the cost of energy. Money is a tangible item even in the lives of young students. Abstract ideas of renewable versus non-renewable supplies, alternate energy sources, and environmentally degrading sources are left to later study.

Of the possible energy conservation projects, electricity is the easiest to carry out at school. Those on gasoline, natural gas, wood, and other energy conservation projects are more easily done at home.

The activity is built around an energy conservation meter. Every time that a conservation group member saves energy at school, it is recorded on a card and added to the energy conservation meter. No attempt is made to quantify energy conservation in grade one.

STUDENT ROLE

Conservationist

MATERIALS

3 X 5 cards
two meters (6 ft) of chart paper.
colored markers
Student Page 1.9.2 CONSERVING ENERGY AT HOME

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PRODUCTS

The Energy Conservation Meter
Completed Student Pages

PROCEDURES

1. **Introduce the activity with a discussion about conservation.**

   Ask such questions as these:
   - What kinds of energy do we have to pay for?
   - How can we reduce the amount of money we have to pay for these kinds of energy?
   - What do we use these kinds of energy sources for?
   - What might happen if we did not have these energy sources?
   - Do you think we use more of these energy sources than we need?
   - How could we find out?

2. **Have the student groups plan ways to try to conserve energy.**

   Point out that it makes no sense to turn off the lights, leaving everyone in the dark because then we couldn't get any work done. But, if we turn off a light in a storeroom that we are not using, that is conservation.

3. **Have the class make and use their energy conservation meter.**

   Every time group members find a way to save energy, they should put a 3 X 5 card on the energy conservation meter.

   The card should show
   - A group name.
   - The date.
   - What was done to conserve energy.

Before the card goes on the meter, the class must agree that the energy is not needed.

4. **Periodically review and discuss the entries.**

Ask such questions as these:

- How many times have we saved energy?
- Which group saved energy the greatest number of times?
- Do we use more energy than we need to use?
- Could you save energy at home?

EXTENSIONS

- Have the students make a home conservation meter using Student Page 1.9.2 CONSERVING ENERGY AT HOME.
- Have the students invent logos for use on the energy conservation meter to indicate how energy was saved.

1.9.3 CONSERVING WATER

OBJECTIVES

The students
- Relate conserving water to water needs during droughts.
- Relate saving of water to saving money.
- Use water wisely.
- Create a working definition of conservation.

BACKGROUND

Water is also used as part of the conservation experience. The need for water conservation is especially meaningful after times of drought. Students who have lived through such a period will relate more readily to this activity than those who haven't. Over and above the threat of drought, students should understand that it costs money to deliver water to homes and schools.

This activity is built around a water conservation meter. Every time that group members save water at school, they write on a card what was done and add it to the scale of the water conservation meter. No attempt is made to quantify water conservation in first grade.

STUDENT ROLE

Conservationist

MATERIALS

3 X 5 cards
two meters (6 ft) of chart paper
colored markers
Working Dictionary
Student Page 1.9.3 CONSERVING WATER

BEST COPY AVAILABLE

PRODUCTS

The Water Conservation Meter
Working definition of conservation
Completed Student Pages

PROCEDURES

1. **Introduce the activity by discussing water conservation.**

   Ask such questions as these:
   - Does anyone know what a drought is?
   - What happens during droughts?
   - Why do we have to be very careful with the water we use during droughts?
   - What are some of the things we use water for at school?
   - Where do we get our water at school?
   - Do you think we use more water than we need to?

2. **Have student groups plan ways to try to conserve water.**

   Point out that it makes no sense not to use water if it means that everyone gets sick because we did not wash our hands. However, if we turn off a faucet that is running without anyone using water, we have real conservation.

3. **Have students invent and use a water conservation meter.**

   Every time group members find a way to save water, have them put a 3 X 5 card on the water conservation meter.

   The card should show
   - The group name.
   - The date.
   - What was done to conserve water.

   Before the card goes on the water conservation meter, the class has to agree that the water conserved was not really needed.

4. **Discuss the activity with the class.**

   Ask such questions as these:
   - How many times did we conserve water?
   - Do we use more water than we need to?
   - Could you conserve water at home?
   - What do we mean by conservation?

5. **Have students create a working definition of conservation and record it in the working dictionary.**

EXTENSIONS

- Have students invent logos to use on the water conservation meter cards.
- Have students make a home water conservation meter using Student Page 1.9.3 CONSERVING WATER.

1.9.4 DECOMPOSITION AND UNEARTHING

OBJECTIVES

The students
- Unearth materials buried in kindergarten to check for decomposition.
- Determine the degree of decomposition.
- Create a working definition of decomposition.
- Use their definition to determine the relative rate of breakdown.
- Explore decomposition rates.

BACKGROUND

This activity and Activity 1.9.5 DECOMPOSITION AND REBURIAL are to be done twice during the year. The first time is during the first two months of the first grade and then again in during the last weeks of the first grade.

In kindergarten students buried materials in perforated or mesh plastic bags. Each bag had a tag identifying its contents. Contact the kindergarten teacher for further information. In this activity students unearth materials and compare their decomposition with fresh samples. Materials that have been buried may include plastic, paper, tin cans, galvanized nails, fruit, bone, twigs, wood, glass, aluminum cans, iron nails, Styrofoam, meat, grass, shell, and others.

TIMETABLE

	Unearthing Activity 1.9.4	Reburial Activity 1.9.5
Fall	Watch for decomposition.	Add new material.
Spring	Watch for decomposition.	Protect materials.

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STUDENT ROLE

Environmentalist

MATERIALS

record of materials buried in kindergarten
samples of materials buried
shovel
hand lenses
Working Dictionary
Student Page 1.9.4 DECOMPOSITION

PRODUCTS

Working definition of decomposition
Completed Student Pages

PROCEDURES

1. **In the fall have students recall what was buried in kindergarten.**

   Students who had DASH in kindergarten will have a record of buried materials in their Science Record Book.

   Ask such questions as these:
   - What was buried?
   - What do you think has happened to the things you buried?

2. **Have the students dig up the buried materials.**

   Have each group record what they found on Student Page 1.9.4 DECOMPOSITION. In the spring use Student Page 1.9.5 DECOMPOSITION AND REBURIAL.

   Ask such questions as these:
   - Are there things that cannot be found? What were they?
   - What do you think happened to them?
   - Are there things that seem to look like new? What are they?

- Are there things that look very different? What are they? How have they changed?
- Are there things that smell? What are they? How do they smell?
- What does decomposition mean?
- Can you put the things you have recovered in an order from most decomposed to least decomposed?
- Did you make any predictions about decomposition? How successful were you in your predictions?

3. **Have the students create a working definition for decomposition and record it in the Working Dictionary.**
4. **Have the students rebury these materials and some new ones. See Activity 1.9.5 DECOMPOSITION AND REBURIAL.**
5. **In the spring have students repeat Procedure 2.**

1.9.5 DECOMPOSITION AND REBURIAL

OBJECTIVES

The students
- Rebury materials to further measure their rate of decomposition.
- Experiment to see whether they can retard the rate of decomposition.

BACKGROUND

This activity is done within a day or two of Activity 1.9.4 DECOMPOSITION AND UNEARTHING. In the fall students rebury the materials that have not fully decomposed in the kindergarten burying. Students also add other materials they want to observe.

In the spring student groups are challenged to try to retard the decomposition of meat, paper, nails, wood and other materials.

STUDENT ROLE

Environmentalist

MATERIALS

plastic mesh bag or old nylon stockings with runs
shovel
materials left from kindergarten and the spring unearthing to be reburied
new burial materials as requested by students
retarding materials as requested by students
Student Page 1.9.5 DECOMPOSITION AND REBURIAL

PRODUCTS

Completed Student Pages

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PROCEDURES

1. **In the fall students rebury their materials to watch for further decomposition.**

   Have the students
   - Predict what will happen over the year.
   - Choose some new materials they wish to observe decompose.
   - Plan where to bury the materials.
   - Plan how to mark the location.
   - Keep a record of what was buried, where it was buried, and their predictions of what will happen.
     ✔ Use Student Page 1.9.5 DECOMPOSITION AND REBURIAL.

2. **In the spring challenge student groups to invent a way to keep meat, paper, nails, wood, etc., from decomposing when buried. Have each group select one material and method.**

   Ask such questions as these:
   - What way have you invented to protect your material from decomposing?
   - Why do you think it will work?

3. **Students then rebury their materials for study in grade two.**

   Have the students
   - Protect their material in preparation for reburial.
   - Rebag and label all materials both old and new.
   - Rebury the materials.

4. **Record reburial information on Student Page 1.9.5 DECOMPOSITION AND REBURIAL and save it in their Science Record Book for use in grade two.**

1.9.6 RECYCLING

OBJECTIVES

The students
- Collect recyclable plastics.
- Recycle plastic when possible.
- Sell to a recycler.
- Experience working and sharing with older students.
- Reuse plastic containers.

BACKGROUND

At each grade level in DASH the students collect some kind of material for recycling. Plastic is the material suggested for recycling in grade one. Fifth graders help first graders with this activity.

The students send a letter to a commercial recycler requesting that a representative come to the school to show them what they should collect and how to store it. The administration needs to be contacted concerning the storage of the plastic. Parents are also contacted for their contributions.

In some places where plastic is not yet recycled, glass is substituted as the recyclable material. There will be safety problems with glass that should be discussed with the recycler and the students.

STUDENT ROLES

Recycler
Conservationist

MATERIALS

storage containers for the material to be recycled
Student Page 1.9.6 RECYCLING

PRODUCTS

Completed Student Pages

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PROCEDURES

1. **Have the students write letters to a fifth grade class to ask for their help in their recycling project.**

2. **Have the first and fifth graders plan the activity.**

   Have the students consider such things as
   - Writing letters to a recycler or a recycling group to come to the class to show students what they should collect and talk about binding, storage, and selling.

   - Writing letters to other classes and parents asking for contributions.

   - What plastic is to be collected.

   - How the plastic is to be collected.

   - Where the plastic is to be stored.

   - Inventing and making storage containers.

   - Planning and sharing in the proceeds from the plastic collection.

   - What plastics could be recycled for other activities in their classrooms.

   - Invent and label storage containers to store the plastics to be recycled for classroom use.

3. **Have the classes carry out the recycling project.**

4. **Review the project with the first and fifth graders.**

   Have the students
   - Give team reports.

   - Assess how things could be done better next time.

   - Decide on the final plan for the use of the proceeds from the recycling.

EXTENSIONS

Have the students

- Hold a recycling party. Invite all the people who helped with the project. This can be a time for a review session involving adults.
- Challenge the students to invent new ways to reuse plastics for projects in art, science, music, etc.

SP 1.9.1

DASH

CONSERVING CLASSROOM RESOURCES 1.9.1

Name: ____________________

Date: ____________________

Assigned item:

Group members:	Draw a picture of your storage container. Label it.
Where is your storage container?	
Possible uses for ____________________ ____________________ ____________________ ____________________	Ways we did use ____________________ ____________________ ____________________ ____________________

CONSERVING ENERGY AT HOME
1.9.2

Name: ____________________

Date: ____________________

Fill out a card each time you conserve energy. Cut out the cards and paste on colored paper to make a HOME ENERGY CONSERVATION METER like the one in school.

Kind of energy: Date: How conserved:	Kind of energy: Date: How conserved:
Kind of energy: Date: How conserved:	Kind of energy: Date: How conserved:
Kind of energy: Date: How conserved:	Kind of energy: Date: How conserved:

DASH

CONSERVING WATER 1.9.3

Name: ____________________

Date: ____________________

Cut out and glue pieces together. Fill in and color one block each time you conserve water.

Date: ____________________
How?

Date: ____________________
How?

Date: ____________________
How?

Date: ____________________
How?

GLUE

Date: ____________________
How?

Date: ____________________
How?

WATER CONSERVATION METER

DASH

DECOMPOSITION
1.9.4

Name: ______________________

Date: ______________________

THING BURIED	OBSERVATIONS

DASH

DECOMPOSITION AND REBURIAL
1.9.5

Name: ______________________

Date: ______________________

DATE OF REBURIAL		
LOCATION OF REBURIAL		
DATE OF UNEARTHING		
ITEM BURIED	PREDICTIONS	OBSERVATIONS

In the spring, be sure to mark which item your group protected from decomposition.

How did you protect it? ______________________________

DASH

RECYCLING
SP 1.9.6

Name: ______________________

Date: ______________________

Draw pictures of ways to recycle plastics.

DASH

GRADE ONE
CLUSTER 10

Matter, Space, and Construction

1.10.1	Meter-String Can
1.10.2	Outdoor Study Area Mapping
1.10.3	Testing for Water
1.10.4	Plumbing
1.10.5	Water Systems
1.10.6	Air
1.10.7	Bubbles in Water
1.10.8	Bubbles in Air
1.10.9	Building with Air
1.10.10	Floor Plan
1.10.11	Floor Plan Model
1.10.12	Cardboard House Plan
1.10.13	Building a Cardboard House
1.10.14	Painting The House
1.10.15	Furnishing The House
1.10.16	Sewing
1.10.17	Weaving
1.10.18	Warming and Cooling The House
1.10.19	Lighting The House
1.10.20	Safety Equipment

1.10.1 METER-STRING CAN

OBJECTIVES

The students

- Make a measuring string and a winding can for storage.
- Calibrate the measuring string in meters.
- Discuss the need for standard units of measurement.
- Use the string line in measuring distances.

BACKGROUND

Students make a measuring string that will be used in many activities. Make the measuring string immediately prior to its use in the classroom or field.

STUDENT ROLE

Surveyor

MATERIALS

three-pound coffee can with plastic lid per group
17–20 meters of string per group
1 roll half-inch masking tape
1 meter stick per group
chalk
1 waterproof felt pen per group
Student Page 1.10.1 MEASURING STRING

PRODUCTS

Standardized meter-string cans
Completed Student Pages

PROCEDURES

1. **Demonstrate how to construct a meter-string can. Have student groups work along with you.**

   - Mark off the length of the classroom in meters. Use chalk to mark the meter points on the floor. Rooms are usually 8 or more meters in length. The string should be at least 16 meters long.
   - Stretch a string up and back the length of the room.
   - Mark each meter point along the string with a piece of tape.
   - Number each meter on the tape with a waterproof pen.
   - Attach the string to a large can by tying it to a washer through a hole in the can.
   - Wind the string around the outside of the can for storage.
   - The can may be used for equipment storage in the field.
   - Place a rock in the can to anchor it so one person can make measurements.

2. **Have the students standardize their measuring strings.**

   Ask such questions as these:
   - How long is your string compared to others?
   - Are the intervals between the meter points the same?
   - How many meters can you measure with your measuring string?
   - Is this number the same as others? Why?
   - Does any tape need to be renumbered? Which one? Why?
   - What advantage is there in using a large can to wind the string on?

3. Have the students use Student Page 1.10.1 MEASURING STRING to practice measuring with their meter string cans.

EXTENSIONS

- Introduce 1/2 meters and 1/4 meters by folding the string.
- Cut 2 meter sticks—one in halves, one in quarters—to introduce 1/2, 1/4, 2/4, and 3/4 meters.

1.10.2 OUTDOOR STUDY AREA MAPPING

OBJECTIVES

The students
- Set boundaries.
- Relocate boundaries.
- Practice mapmaking.

BACKGROUND

This activity introduces the study of seasonal changes to plant and animal populations in some place on the school grounds. This Outdoor Study Area (OSA) is a permanent bounded area. The students map the OSA in the fall, winter, and spring. It can be located in a wild area or in one tended by the maintenance staff.

Eight plots, about 1 meter by 3 meters each (3 ft. X 9 ft.) will adequately handle 32 students. A rectangular shape is recommended to make mapping easier. Stakes should be placed at the boundary corners. The teacher can do this with the students or personally ahead of time. If stakes are driven in flush with the ground, they will not interfere with people or lawn mowers. Staples can be put into the tops of the stakes to hold the string marking boundary lines.

Students work in small groups to map their individual plots on quadrate paper. One-inch-square quadrate paper works well. These group maps are then glued together on chart paper to make a class map of the OSA. An alternate method is to begin with a large piece of quadrate paper scaled to show the entire OSA.

Scale will depend on the size of the squares on the quadrate paper. A satisfactory scale is
4 inches (about 10 cm) = 1 meter
The teacher should keep a key to group plot assignments.

Groups should probably be no larger than 4 students. Each member should be given an assigned job—observer and recorder of plants, of animals, of non-living things, etc. Assignments will depend on the location and content of the OSA.

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STUDENT ROLES

Surveyor
Cartographer

MATERIALS

12–18 short wooden stakes (8–10 cm or 3–4 in long)
meter-string cans from Activity 1.10.1 METER-STRING CAN
chart paper
tape
stapler
hammer
string
quadrate paper
pencils
clipboards

PRODUCTS

Three group plot maps for fall, winter, and spring
Class OSA map

PROCEDURES

1. **Show the students the place where the OSA will be located and introduce the question to be studied during this activity, "What will happen in the OSA as the seasons change?"**

   Discuss the following questions and ideas.

   - What do you think will occur in the OSA this winter? This spring? Capture the idea of changes.

   - How can we find out what is happening? Arrive at the idea of checking periodically.

   - How can we be sure we are coming back to the same place? Develop the idea of marking it.

   - How can we tell whether changes occur? Develop the idea of having a map that shows what is in the area when we begin.

2. **Sketch the boundaries of the OSA on the board. Give the approximate dimensions of a group plot and draw them on the OSA sketch.**

    - Have the students discuss (in small groups) how many squares could be used to represent one meter.
    - Have one or more groups demonstrate their ideas on an overhead.
    - Get class agreement on which scale to use.
    - Draw an example of a plot on quadrate paper using the scale.

3. **Have the students make 10-meter lines. See Activity 1.10.1 METER-STRING CAN.**

4. **In the field show students (or set them with the class) the corner stakes that establish the boundaries of the OSA.**

    - Discuss how to use the 10-meter lines to lay out the boundaries of the plots.
    - Have students demonstrate their ideas.
    - Agree on the best technique.
    - Assign plots.
    - Use the 10-meter lines to mark plot boundaries.

5. **Have the student groups draw their plot on quadrate paper.**

    Have the students
    - Draw the boundaries using the agreed scale.
    - Locate all big physical features in their plot and draw them on their map.
    - Establish reference points so maps can be oriented correctly when assembling the total OSA map.
    - Make two copies of the original plot map to be used in Activity 1.3.3 ANIMAL SURVEY.

- At the end of the day's field exercise, have students roll up the 10-meter lines. Boundaries can quickly be reestablished each time students are in the field.

6. **Have the students piece group plot maps together to make a whole Class OSA Map.**

   - Cut out plot maps along their boundaries.
   - Glue plot maps to a large piece of chart paper to make a complete map of the OSA.

EXTENSION

- Have the students add keys, directions, and titles to the Class OSA Map and to the individual maps.

1.10.3 TESTING FOR WATER

OBJECTIVES

The students
- Test things for the presence of water using cobalt chloride paper.
- Observe that water can be driven out of things as a vapor.
- Observe that water is in many things around us.
- Observe that water is present in all living things.

BACKGROUND

This activity introduces the study of water. It is built around an ongoing inventory. Students are to find how many different things contain water.

Students will use cobalt chloride paper to test for water. Blue cobalt chloride paper touched to water turns red. When it is dried in the hot sun or gently warmed over a heat source, it turns back to its original blue color for reuse. Tiny pieces of the paper work well.

To make cobalt chloride paper, dissolve 10g of cobalt chloride in 100 ml of water. Saturate absorbent paper (filter paper, paper towel, etc.) in the solution. Dry the paper in the sun or a slightly warm oven. Cut into strips and store in an airtight jar.

Caution: Cobalt chloride solution is toxic if ingested. It may irritate eyes, skin, and respiratory system. Wash hands after handling.

Water can be removed from many substances. Put the substance in a Pyrex container and heat it on a hot plate. Collect the water on a cool glass or porcelain surface held above the container. Use tweezers and tongs. Touch the blue cobalt chloride paper to any visible moisture that collects. Clear liquids can be tested directly (saliva, tears, sweat, etc.). For most liquids the test paper can be used again after it is dried. If the paper is soiled, throw it away.

Set up a water-testing activity center. Be sure to discuss and post safety rules. Make a class chart to record what substances students have found that contains water. The teacher's role is that of program

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manager and consultant. New materials to be tested by heating should be screened by the teacher. Material is acceptable for heating unless it is foul smelling, highly flammable, petroleum-based, or appears dangerous.

STUDENT ROLE

Scientist

MATERIALS

chart paper
markers
a jar of unused cobalt chloride paper
a jar for used cobalt chloride paper
a hot plate
a small Pyrex heating container (a beaker will work)
a glass or porcelain surface on which to collect moisture (a jar or dish will work)
tongs
tweezers
hot mitts
tempera paint
rubbing alcohol
milk
Student Page 1.10.3 TESTING FOR WATER

PRODUCTS

Class chart things that contain water
Completed Student Pages

PROCEDURES

1. **Introduce the activity with a class discussion about water being necessary for living things.**

   Ask such questions as these:
   - Do we contain water?
   - Do other animals contain water?
   - Do plants contain water?
   - How might we find out whether something contains water?

2. **Demonstrate the use of cobalt chloride paper as a water detector.**

   - Show how it changes from blue to red when dipped in water.
   - Show how to get the cobalt chloride paper to turn back to blue by slightly heating it or putting it in the sun.
   - Have students test their saliva and rubbing alcohol.
     ✔ Saliva contains water; rubbing alcohol does not.

3. **Show students the way to find out whether things that stain the paper have water (milk, paints, etc.).**

   - Heat milk in a Pyrex container on a hot plate.
   - Condense some vapor on a cool glass.
     ✔ The vapor will be seen to rise from the milk.
     Use tongs to hold the glass.
   - Test the moisture with cobalt chloride paper.

4. **Show students that things that seem dry may contain water.**

   Heat some leaves in a Pyrex container and test the vapor for water.

5. **Set up a water activity center, divide students into working teams and make rules for doing investigations, and have students make a class chart things that contain water.**

   Some suggested rules are
   - Check with teacher if the material is safe to test.
   - Use the hot plate only with teacher supervision.
   - Use tongs and hot mitts to handle hot things.
   - Be sure to record and validate your results.

   The Class Chart should include
   - What was tested.
   - The result of tests (water or no water found).
   - Who ran the test.

- The date of the test.
- Result of the validation test.
- Who ran the test.
- Date of the test.

Teams must validate their own work. Someone from a different group may run the same test for further validation.

6. Summarize and discuss the activity with the class.

Ask questions such as the following
- In what kinds of things did you find water?
- What kinds of things did you find that contained no water?
- Do living things seem to contain water? What kinds of living things?
- Do once-living things seem to contain water? What kinds of once-living things?
- Do non-living things seem to contain water? What kinds of non-living things?

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1.10.4 PLUMBING

OBJECTIVES

The students
- Write letters of invitation and thanks.
- Trace out the water system of the school.
- Trace out the sewer system of the school.

BACKGROUND

This activity is designed to give students an idea of how water is carried to the faucets and fountains in the school. Ideally, the system is traced from the start at the city's water tank or reservoir, through the streets, to the school.

It is helpful if the school custodian will take students on a plumbing tour of the school. A good time for such a tour is when a pipe is being dug up for repair.

STUDENT ROLE

Plumber

MATERIALS

chart paper
markers
Student Page 1.10.4 PLUMBING

PRODUCTS

List of questions
Completed Student Pages

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PROCEDURES

1. **Introduce the activity by discussing the need to know how water gets to our faucets, fountains, and toilets.**

   Suggest that we could invite the janitor (district engineer or other person) to take us on a tour of the school's water system.

2. **Have students write a letter to the appropriate person asking for a tour.**

3. **Have students brainstorm the questions that they would like to ask.**

   The following questions ought to be included
   - Where is the city's water stored?
   - How does the water get to school?
   - Where does it come into the school?
   - Can you shut off the water to the school? How?
   - How does the water get to the drinking fountains? To the faucet in our room? To the toilets?
   - How do we get hot water?
   - What happens to waste water?
   - How is it carried out of the school?

   Make a list of the questions to be asked.

4. **Go on the field trip.**

5. **Write a letter of thanks to the person who led the field trip.**

EXTENSION

- Trace the plumbing at home. Use Student Page 1.10.4 PLUMBING.

REFERENCE

Cole, Joanna.
1986 *The Magic School Bus at the Waterworks*. Scholastic Inc. New York.

1.10.5 WATER SYSTEM

OBJECTIVES

The students
- Identify the ways that water is delivered to school and home.
- Identify some of the many ways that water is controlled.
- Create a large diagram of the water delivery systems in their home, school, and/or community.
- Show the connections between different parts of the water delivery system.
- Collect information on the way water is collected and delivered to and removed from schools, homes, and the community.

BACKGROUND

Study of the technology of water is found at each grade level of DASH. This activity is designed to start students organizing their conception of water systems.

Students produce a beginning water diagram, mural, or collage showing how water is collected, delivered for use, and removed from our school, homes, and community. The diagram may show such things as dams, aqueducts, reservoirs, pipes, water tanks, canals, standpipes, pumps, roofs, gutters, rain, catchments, hoses, faucets, sprinklers, drains, streets, sewers, rivers, and lakes. Where possible, the route of water should be traced from one delivery or storage device to another.

Completeness of the system is not essential at this point. What is important is for students to begin to look at the ways that the water they use is collected and controlled and for students to begin to see the connections between water delivery and use systems.

STUDENT ROLE

Engineer

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MATERIALS

chart paper
markers
crayons
magazines
scissors
glue
Student Page 1.10.5 WATER SYSTEMS

PRODUCTS

Class mural or diagram
Completed Student Pages

PROCEDURES

1. **Introduce the project of making a diagram or mural showing how water is delivered to the community, home, and school.**

    - Review information collected to date on water.

    - List the places students know where water is stored or collected in the community (lakes, reservoirs, water tanks, roofs, etc.).

    - List the ways water is carried in the community (pipes, streams, ditches, etc.).

2. **Have small student groups fit together the pieces of the water delivery system. Use sketches of pipes, ditches, canals, etc., to make the connections.**

    Use Student Page 1.10.5 WATER SYSTEMS.

3. **Compare the ways each group solves the connection problems.**

    Ask such questions as these:
    - Were you able to show connections between all of the things we have listed on the board?

    - How did you show the connections?

- What parts of the system are you still not sure about? How can we find out?

4. **Have students use their sketches to create a class mural, collage, or model of the community water system.**

1.10.6 AIR

OBJECTIVES

The students
- Discover how air can be captured and confined.
- Discover some of the properties of air.
- Discover some of the properties that air shares with water.

BACKGROUND

This activity introduces the concept of a gas. Begin by reading the Focus Book, THINKING ABOUT AIR.

The inquiry flows out of a demonstration-dialogue. The order may vary, but the elements of the dialog should be covered. The activity can be stopped anytime that the students do not come up with ideas to continue the inquiry. Return to the activity when they have new ideas. The Inventor's Box can be stocked with items to encourage student ideas.

The teacher or puppet takes the role of one who believes there is no such thing as air. The students respond to the challenges by inventing demonstrations to show that air is something.

Some possible inventions are
- To feel air:
  - Fan with a piece of paper.
  - Blow on your hand.
- To capture air:
  - Invert a cup and push down in water.
  - Blow up a balloon or bag.
- To pour air:
  - Connect two plastic bags with a cardboard tube. Squeeze air from one to another.
  - Balloons can be used the same way.
  - Air can be poured under water from one container to another.
- To see air:
  - Look at air in bubbles in water.
  - Color air with smoke.

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- To push things with air:
  - Direct a flow of air against paper, dust, etc.
- To squirt air:
  - In bags or balloons.
  - With plastic containers in water.

A class chart is kept as each new challenge is introduced and met.

The class is then divided into air and water groups. The groups work in pairs. One group challenges the other, demonstrating some property or something their substance can do. The other group responds by showing that their substance has the same property or can do the same thing. Then group roles are reversed.

STUDENT ROLE

Researcher

MATERIALS

chart paper
markers
aquarium, optional
plastic bags
paper tubes
balloons
clear plastic cups
water containers
jars
straws
Focus Book, THINKING ABOUT AIR

PRODUCTS

Class chart water versus air
Inventions to demonstrate that air is something

PROCEDURES

1. **Read the Focus Book, THINKING ABOUT AIR to the class.**

   Ask such questions as these:
   - Do you think the children did their homework?

   - What were some of the things they may have thought of?

2. **Begin the dialogue by splashing water and saying, "I can feel water. I don't feel air. Air is nothing."**

   Ask such questions as these:
   - Do you think air is nothing?
   - What makes you think this?
   - Is air something like water? If so, in what ways?
   - Can you feel water? What does it feel like?
   - Can you feel air?

3. **Have students invent ways to make someone else feel air.**

   Ask such questions as these:
   - Do you agree with me?
   - Did anyone feel air
   - How did you make it possible to feel air?
   - Can you demonstrate your method?

4. **Begin the class chart water versus air. Then say, "I'm still not convinced I can pour water. I can't pour air. Air is nothing."**

   Ask such questions as these:
   - Do you agree with me?
   - Can you pour air?
   - What do we mean by pour?

5. **Have students invent a way to pour air.**

   Ask such questions as these:
   - Did anyone pour air?
   - How did you pour air?
   - Can you demonstrate your method?

6. **continue the dialogue with, "I'm still not convinced. I can see water. I can't see air. Air is nothing."**

   Ask such questions as these:
   - Do you agree with me?
   - Can you see air?
   - Can you show this to someone else?

7. **Have students invent a way to see air.**

   Ask such questions as these:
   - Did anyone see air?
   - How did you make it visible?
   - Can you demonstrate your method?

8. **"I'm still not convinced. I can move things with water. I can't move things with air. Air is nothing."**

   Ask such questions as these:
   - Do you agree with me?
   - Can air move things about?
   - Can you show this to someone else?

9. **Have students invent a way to move things about with air.**

   Ask such questions as these:
   - Did anyone move things about with air?
   - How did you move them?
   - Can you demonstrate your method?

10. **"I'm still not convinced. I can capture water. I can't capture air. Air is nothing."**

    Ask such questions as these:
    - Do you agree with me?
    - Can you capture air?

11. **Have students invent a way to capture air.**

    Ask such questions as these:
    - Has anyone captured air?
    - How did you capture it?
    - Can you demonstrate your method for us?

12. **Have student groups compare water and air.**

    Have them challenge each other.

13. **Discuss why air is so important with the students.**

    Ask such questions as these:
    - How is water like air?
    - How is water different from air?
    - Is water something or nothing?
    - Is air something or nothing?
    - What are some of the properties by which we can sense air?

1.10.7 BUBBLES IN WATER

OBJECTIVES

Students
- Predict the behavior of air in water.
- Observe the behavior of air in water.
- Observe the behavior of containers in water.

BACKGROUND

BUBBLES IN WATER is usually followed by Activities 1.10.8 BUBBLES IN AIR, and 1.10.9 BUILDING WITH AIR. BUBBLES IN WATER is a semi-directed activity designed to study containers and bubbles in water. It shows that a gas can be captured, confined, controlled, and quantified.

Containers

The activity is done in an aquarium, a glass gallon jar, or a clear plastic bag viewing box. A viewing box is made by cutting windows in the side of a cardboard box, lining the box with clear plastic, and filling it with water.

STUDENT ROLE

Experimenter

MATERIALS

aquariums, gallon jar, or cardboard viewing boxes
buckets
tubing or straws
graduated jars
mops
newspapers
Student Page 1.10.5 BUBBLES IN WATER

PRODUCT

Class chart bubbles in water
Completed Student Pages

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PROCEDURES

1. **Have students predict what they think a bubble of air will do and what it will look like in water. Record the predictions on Class chart Bubbles In Water. Have students test their predictions by blowing bubbles into water. Record observations on the chart.**

   Ask such questions as these:
   - Where did the bubbles go?
   - Did they go straight?
   - What is the shape of small bubbles?
   - What is the shape of large bubbles?
   - Do bubbles change their shape? If so, how?
   - Do little bubbles act the same as big bubbles?
   - Do some bubbles seem to move faster than others?
   - What kinds of bubbles move fastest? How did you test this?
   - What happens when you have a whole lot of bubbles at one time?
   - What questions do you want to find out about bubbles? Try to find answers.

2. **Have students share their questions and answers. Add this information to the class chart bubbles in water.**

3. **Have students put a jar under water, mouth *up*. Have them lift it out of the water to find out what happens and how it feels.**

   Ask such questions as these:
   - How does the jar feel as it gets further and further out of the water?
   - How much water are you bringing up?

- What happens when you blow bubbles of air into the mouth of a submerged jar when its mouth is turned up.

4. **Have students put a jar *upside* down in water. Have them lift it out of the water to find what happens and how it feels.**

   Ask such questions as these:
   - How does the jar feel as it gets further and further out of the water?
   - How much water are you bringing up?
   - How is this experiment different from the one in which we had the mouth of the jar turned up? How is it similar?
   - What happens when you blow bubbles into the mouth of the submerged jar when its mouth is down?

5. **Have students experiment freely with bubbles and air to answer their own questions. Use Student Page 1.10.~~5~~ 7 BUBBLES IN WATER to record their ideas. Do not help them with questions unless they run out of ideas.**

   Questions such as the following may be used.
   - What happens to the air in the jar?
   - Do bubbles coming out of the water in the jar seem to leave the aquarium?
   - How does the jar partly filled with water feel as it gets further and further out of the water?
   - You can put air into a jar underwater. Can you take it out?
   - Can you pour water from one container to another under water?

6. **Have students report on their experimentation.**

   Ask such questions as these:
   - Do our observations help us think about air as being something? If so how?
   - How might we measure the amount of air underwater.

EXTENSION

- Create a Bubbles in water center and have the students continue to explore and report what they find.

1.10.8 BUBBLES IN AIR

OBJECTIVES

The students
- Invent ways of making bubbles of different sizes.
- Observe bubbles in air.
- Compare bubbles in air and bubbles in water.

BACKGROUND

In this activity students compare the shapes, movement, and other properties of soap bubbles in air with air bubbles in water. This is an open-ended inquiry with the questions coming from students.

This is an outdoor activity.

For bubble solution, mix
- 1 cup Dawn or Joy liquid detergent
- 10 cups water
- 1/4 cup glycerin or corn syrup (Both are optional.)

CAUTION: Some people are allergic to glycerin and/or detergent. Either may cause eye or skin irritation.

Bubbles do best in high humidity. Just after a rain or early morning are excellent times. Add a bit more water to the solution if results are not satisfactory.

STUDENT ROLES

Experimenter
Inventor

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MATERIALS

chart paper
markers
Styrofoam cups
straws
string
Styrofoam plates or meat trays (Holes can be made for bubble making.)
soft drink plastic holders for 6-packs
dish pan for solution
light corn syrup or glycerin
Dawn or Joy detergent
Student Page 1.10.8 BUBBLES

PRODUCTS

Class chart bubbles in air
Bubble makers
Completed Student Pages

PROCEDURES

1. **Have students invent bubble makers and prepare the bubble solution.**

   Bubble makers can be made from Styrofoam cups, plates and trays, straws, straws and string, and plastic 6-pack holders. Use the Inventor's Box to stimulate ideas.

   Demonstrate the use of bubble makers.

2. **Have students suggest things to observe and questions to answer.**

   Make a class chart about bubbles in air.

3. **Have students investigate bubbles of air in air.**

   This is an activity best done outdoors.

4. **Record student observations of soap bubbles on the class chart bubbles in air. Compare observations with bubbles in ware (Act. 1.10.7). Record comparisons on Student Page 1.10.8 BUBBLES or another class chart.**

Some suggested questions are

- How were bubbles in air different from bubbles in water?
- How were bubbles in air similar to bubbles in water?
- Which were bigger?
- Which were smaller?
- Did they float the same way?
- When did bubbles in air seem to float up high?
- What other observations did you make?
- What questions did you ask and what answers did you find?

DASH 1.10.9 BUILDING WITH AIR

OBJECTIVES

Students
- Use plastic bags to make air-filled structures.
- Discover that confined air can be used to make rigid structures.

BACKGROUND

This activity shows students how to make rigid structures when air is confined in a flexible container. Students make balloon structures out of plastic bags. The bags can be sealed by applying the heat of an iron through newspaper.

To make a balloon structure from a plastic bag
- A template of the desired shape is cut out of corrugated cardboard. See below.
- A plastic bag is laid in the center of the frame of template.
- The template is placed on top of the bag, covering the area that will be filled with air.
- The part of the bag to be sealed will be exposed on the frame.
- One or two sheets of newspaper are placed on top of the plastic. This prevents the iron from sticking to the plastic.
- An iron at medium heat is run over the paper covering the plastic.
- One end of the plastic bag is left unsealed so that air can be blown into the balloon.
- The edges of the plastic is now cut, leaving about 2.5 cm. or 1 inch of newly sealed plastic around the shape.
- Decorate the bag with permanent colored markers.
- The plastic bag is then filled with air and tied.

A template can be made in the following way:
- Draw the shape of the balloon on corrugated cardboard.
- Score the drawing with the edge of a ruler.
- Or, paint the scored depression with water to soften the cardboard and cut along the scored line with scissors.
- Cut out the shape with heavy scissors or a serrated steak knife.

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STUDENT ROLES

Engineer
Constructor

MATERIALS

Steak knives
Rulers
Paint brushes
Plastic bags
Corrugated cardboard
Scissors
Iron
Newspaper
Permanent Colored Markers
Student Page 1.10.9 USING AIR

PRODUCTS

Plastic balloon structures
Completed Student Pages

PROCEDURES

1. **Introduce the question of whether air can make things rigid.**

   Ask questions such as these:
   - Can air be used to make things that are stiff?
   - Could we build a table of air? A house of air?

2. **Demonstrate the method for making a template for a balloon shape and have students make one in their desired balloon shape.**

3. **Demonstrate the sealing of the balloons and help students to construct their balloons.**

4. **Discuss the activity with the students.**

Some suggestions questions are
- Was anyone able to make a stiff shape using air?
- Is air something?
- Can we feel air?
- Can we see air?
- Can we pour air?
- Is air like water?
- How is air like water?

EXTENSION

- Establish a project to collect all the examples students can find of places where air is used to build things, push things, etc. Have students record their observations on Student Page 1.10.9 USING AIR.

DASH

1.10.10 FLOOR PLAN

OBJECTIVES

The students
- Practice mapping skills.
- Practice measuring skills.
- Practice area measurement.
- Practice drawing skills.
- Create a classroom floor plan.

BACKGROUND

This activity is the first in a series of activities to make a classroom cardboard village. Students make two floor plans—a large class floor plan and a smaller individual group floor plan. They work in the same groups that they will be in when they make their houses. Group size can range from 3–6 students.

Length measurements should be made to the nearest quarter of a meter. This can be done by folding a meter of measuring string or a meter-length paper into halves and quarters. A meter stick that has been cut into halves and quarters can also be used. On the floor plan make the length of four squares equal to one meter, so that quarter meters are easily recorded.

STUDENT ROLE

Architect

MATERIALS

large-sized (1-inch) quadrate paper for class floor plan
intermediate sized (1-cm) quadrate paper for group floor plan
measuring strings (See Activity 1.10.1 METER-STRING CAN)
meter sticks
half-meter sticks
quarter-meter sticks
rulers
erasers

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PRODUCTS

Classroom floor plan
Group floor plans

PROCEDURES

1. **Announce that the class is going to build a cardboard village. Establish the need for a floor plan of the classroom.**

   - Explain that students will make one big floor plan and that each group will make a small floor plan.

   - Show the paper to be used.

2. **Discuss the measurements of the floor with the class.**

   Some suggested questions are
   - How can we use our string cans to measure the room?

   - How could we measure the length? Can you demonstrate for us?

   - How can we measure a part of a meter using string?

   - How would we measure a half meter? A quarter meter? Can you demonstrate?

   - How can we measure a part of a meter using a meter stick? Can you demonstrate?

   - How can we make the measurements of the room that we show on a drawing on the board. Can you demonstrate?

3. **Have students organize and measure the classroom floor.**

   Sketch the room on the board and assign measurements.
   Have students
   - Use meter-string cans or meter sticks to make measurements.

   - Record their measurements on the board.

   - Measure lengths to a quarter meter.

4. **Help students to organize the drawing of the floor plan.**

   Locate a place on the large floor plan paper where one of the corners will be drawn.

   Have students
   - Mark a one-meter-by-one-meter square in chalk on the classroom floor in the same corner of the room identified on the floor plan.

   - Have a one-meter-by-one-meter representation marked on the floor plan.

5. **Help students through the drawing of the first wall line on the class floor plan.**

   Some suggested questions are
   - What distance on the floor plan represents one meter on the classroom floor? Who can show us?

   - How long is the wall we have just measured?

   - How long a distance would this be on our floor plan? Who can show us?

   - How did you get that measurement?

6. **Have several groups record measurements on the large floor plan while others work on their individual group floor plans.**

   Use an overhead projection of the small quadrate grid that the students will use to make their individual group floor plan. Ask the same questions that were used to establish the first wall on the large class floor plan.

7. **Have students compare individual group floor plans and help each other to make any corrections.**

8. **Make a key to show the scales used to draw the class and individual group floor plans.**

   Stress the relationship between a meter and the length of the squares on the class floor plan and the smaller individual group floor plans.

9. **Summarize the activity with the class.**

Ask such questions as these:

- How is the big floor plan like the room? How is it different?
- How is the little floor plan like the big floor plan? How is it different?
- How are floor plans like maps? How are they different?
- What was the scale on the big floor plan? What was the scale on the small floor plan?
- Why do we need a floor plan to make a class village?

1.10.11 FLOOR PLAN MODEL

OBJECTIVES

The students
- Reinforce mapping and measuring skills.
- Make scaled 2-dimensional models of the furniture in the classroom.
- Practice area measurement.
- Practice organization and cooperation skills.
- Plan the location for their village.

BACKGROUND

In this activity students use their floor plan to decide where to put the village.

Students make scaled two-dimensional models of the furniture in the classroom for group planning maps and for the class floor plan. They make paper or lightweight cardboard (index cards) models with Post-it glue or TAK on one side. Furniture is measured to the nearest quarter of a meter. Each group is responsible for a different kind of furniture. The groups record the dimensions on the board. It is usually not necessary to measure chairs since they fit under desks.

Precut colored paper or cardboard strips the approximate, proportionate width of classroom furniture. These are cut into furniture models by students. If circular objects are in the room, provide templates.

The activity has two parts. First students place all of the furniture in its present configuration. Then they are given the dimensions of the houses that will be in the village. They are told to plan the classroom so that there will be enough space for 1–6 houses. If a house is to be habitable it should have a base of at least one square meter. There should be a street at least one meter wide between the houses. Students should help decide which plan seems best and make a master plan from it. Check classroom space ahead of time to determine how many houses will actually fit in the room.

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STUDENT ROLE

Space utilization engineer

MATERIALS

colored, scaled strips of paper or index cards to cut out furniture
Post-it glue or TAK
scissors
measuring strings
meter sticks
classroom floor plan
group floor plans
Student Page 1.10.11 FLOOR PLAN

PRODUCTS

Class utilization floor plan
Group utilization plans
Completed Student Pages

PROCEDURE

1. **Explain to the class that we need to know how to move the furniture in the classroom to make room for the village.**

   We need model furniture for the floor plan. We also need to know how big the furniture is and where it is located in the room.

   Some suggested questions are
   - How can we find out how big the furniture is?
   - What should we measure?
   - Since the floor plan looks down at the floor, what part of the furniture would we see?
   - What part would we measure? Get at the need to measure the top.

2. **Have student groups measure different pieces of furniture.**

   Sketch pictures on the board and have students record their measurements.

3. **Demonstrate how students can select strips of precut paper and cut out their models.**

4. **Have groups place their furniture on the classroom floor plan.**

   Since this is a planning map, the furniture's position can be approximated.
   ✔ Help as needed.

5. **Have students make furniture for their group floor plan and position it using the class plan as a model.**

   Some suggested questions are
   - Do we all have the same number of desks, chairs, learning centers, etc.? Verify by counting.

   - Do our floor plans look about the same?
     Have students help each other where there are major discrepancies.

6. **Discuss the details of the village with the class.**

   Include
   - The dimensions of their houses.

   - The number of houses that are to be made.

   - The space between houses.

   - Any other restrictions.

7. **Have students cut out two-dimensional models of the base measurements of their cardboard houses and then move the classroom furniture on their floor plan to accommodate the village.**

8. **Have students discuss their suggested floor plans and then select one floor plan to organize the classroom.**

   Rearrange the large class floor plan so that it is the same as the selected group plan.

9. **Have students sketch the final floor plan on Student Page 1.10.11 FLOOR PLAN and indicate where their group house will be located.**

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1.10.12 CARDBOARD HOUSE PLAN

OBJECTIVES

The students
- Design a cardboard house.
- Reinforce their mapping and measuring skills.
- Practice organization and cooperation skills.
- Practice drawing skills.

BACKGROUND

In this activity students make a plan and model for their cardboard house. Ideally, students should see a house that has been made in previous years to get a sense of size and the limitations and potential of materials. For a habitable house, a vertical height of one and a half meters for the walls will work well. This is in proportion to student body measurements.

STUDENT ROLE

Architect

MATERIALS

an example of a cardboard house (or photographs)
cardboard to be used for the houses
large-sized (1-inch) quadrate paper
meter sticks
half-meter sticks
quarter-meter sticks
rulers
scissors
clear cellophane tape
Student Page 1.10.12 CARDBOARD HOUSE PLAN

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PRODUCTS

Cardboard house plan
Cardboard house model
Completed Student Pages

PROCEDURES

1. **Show the class an example of a cardboard house.**

   Show students the kind of cardboard they will use.

2. **Have student groups draw the plans for their cardboard house on Student Page 1.10.12 CARDBOARD HOUSE PLAN.**

   Plans should include floor, walls, and the roof.

3. **Have students use quadrate paper to make a scale model of the floor of their cardboard house.**

   - Locate where their houses will be in the classroom.
   - Mark the dimensions on the floor.
   - Scale the paper. Four squares will equal one meter.
   - Draw the floor on the quadrate paper.

4. **Show students a model of a house assembled from quadrate paper.**

   Ask questions such as these:
   - How can we make models of the cardboard houses we want to build?
   - How many walls will your house have?

5. **Have students use quadrate paper to draw the walls and roof of their cardboard house to scale.**

   Ask questions such as these:
   - What is the length of the wall?
   - How do the heights of the wall compare?

- How is the roof made?

6. **Have students assemble their model house from quadrate paper drawing and tape.**

   Have them cut out the drawings and tape them together. They should consider how to attach the roof, floor, doors, and how to make windows.

7. **Have groups share their models and modify their plans to the version they wish to build.**

   Record final plans on Student Page 1.10.12 CARDBOARD HOUSE PLAN.

EXTENSION

- Have students add other types of buildings (bank, school, store) to their village at a later time.

1.10.13 BUILDING A CARDBOARD HOUSE

OBJECTIVES

The students
- Build a cardboard house from a model.
- Use saws, hammers, and other tools.
- Practice organization skills.
- Practice measuring skills.

BACKGROUND

In this activity students build their cardboard houses. Large sheets of cardboard are needed for this project. Large cardboard boxes such as refrigerator boxes are ideal.

The students invent ways to cut materials, prevent damage to classroom furniture, fix mistakes, secure houses to the floor, remove tape marks from the floor, and connect pieces of cardboard. Ideas can be found in library reference books on cardboard construction. Inspecting cardboard boxes may also suggest some construction techniques.

The teacher's role is that of safety engineer. Discuss tool care and safety before distributing them to students.

Dry cardboard can be cut with a serrated steak knife. It is easily cut with scissors when wet. Score the cardboard with a dull knife or a nail where the cut will be made. Liberally paint the scored line with water. Allow the water time to soak the cardboard thoroughly before cutting. The cardboard will regain its rigidity when it dries.

STUDENT ROLES

Builder
Inventors

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MATERIALS

library reference books
saws and miter box
serrated steak knives
duct or masking tape
hammers
small roofing nails
lath
scissors
transparent plastic wrap
staplers
glue
rulers
paint brushes
string
other materials as requested by students.

PRODUCTS

Cardboard houses

PROCEDURES

1. **Have students organize their group to build the house.**

   Roles to be considered are
   - Contractor (coordinates activities).
   - Wall team.
   - Roof and floor team.
   - Door and window team.
   - Safety inspector.

2. **Demonstrate special techniques for using cardboard as needed by the students. Encourage their own invention first.**

   Students may need assistance with
   - Using the grain of the cardboard.
   - Cutting of cardboard, using water and scissors, saws and miter box, or steak knives.

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- Making corners.
- Joining cardboard sheets using tape, glue, etc.
- Using lath, hammer, and nails.
- Using wire and string.
- Making window glass using plastic wrap.
- Making hinges.

3. **Have student organize the room according to the agree-upon space utilization plan 1.10.11 FLOOR PLAN MODEL.**

   Trace the floor plan on the classroom floor using chalk.

4. **Allow student groups to construct each house with as few teacher suggestions as possible.**

   Students should be encouraged to invent solutions for their mistakes.

5. **When the village is complete, have a class discussion on house building.**

   Some suggested questions are
   - How is what we have done similar to house building that we see around us?
   - How is it different from the house building we see around us?
   - What would you do to make a better house next time?

REFERENCES

DeBruin, Jerry.
1979 *Cardboard Carpentry*. Good Apple, Inc. Carthage, Illinois.

DASH 1.10.14 PAINTING THE HOUSE

OBJECTIVES

The students
- Observe why houses are painted.
- Practice organizational skills.
- Practice cooperative group skills.

BACKGROUND

This activity is done with Activity 1.10.13 BUILDING A CARDBOARD HOUSE or immediately following it. Using a roller on the cardboard is easier when the house sides are on the floor. Brush painting walls can be done either while the house is up or down. The roof should be painted on the floor. Painting can be done with tempera, or water soluble latex. Latex is the better choice. Cover the floor with newspaper, drop cloths, or plastic covering.

STUDENT ROLE

Painter

MATERIALS

brushes
roller
paint cans
drop cloth or newspaper
paint, latex or tempera
cloths
water
soap
student aprons
Student Page 1.10.14 PAINTING

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PRODUCT

Painted house
Completed Student Pages

PROCEDURES

1. **Introduce the idea of painting the cardboard house.**

   Some suggested questions are
   - What color/s do you want on the outside of your house?
   - What color/s do you want on the inside of your house?
   - What equipment will you need?
   - How can we protect the floor and our clothes?
   - How can we prevent accidents like spilling?
   - Why do we paint houses?

2. **Have student groups organize the painting of their cardboard house.**

   Decisions include
   - Colors.
   - Where to paint.
   - What to paint first.
   - Floor protection.
   - Clothing protection (plastic bag aprons).
   - Spill prevention.
   - Clean-up.

3. **Demonstrate painting technique if necessary.**

   If the painting is done while the walls are flat, have students check with the teacher to see when they are dry and can be turned over.

EXTENSIONS

Have students

- Make a list of kinds of things that are painted. Use Student Page 1.10.14 PAINTING.
- Make a list of different kinds of paints.

1.10.15 FURNISHING THE HOUSE

OBJECTIVES

The students
- Plan the furnishing of their cardboard house.
- Invent the furnishings for their cardboard house.
- Build the furnishings for the cardboard house.
- Practice measurement and drawing skills.
- Observe the construction capabilities of cardboard.

BACKGROUND

This activity follows Activity 1.10.13 BUILDING A CARDBOARD HOUSE and 1.10.14 PAINTING THE HOUSE. It may be an ongoing activity, done whenever students find a need for new furnishings. Furnishings will normally be made of cardboard, though other materials may be used. Use reference books on cardboard construction.

STUDENT ROLE

Furniture builder

MATERIALS

library reference books
cardboard
glue
tape
saws
serrated steak knives
scissors
paint
brushes
garbage bags
iron
other materials as requested by students
Student Page 1.10.15 USING CARDBOARD

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PRODUCTS

Furniture
Completed Student Pages

PROCEDURES

1. **Introduce the need for making cardboard furniture.**
    - Have students decide on what furnishing they need.
    - Show students examples of furnishings that have been constructed before.
    - Have students design and construct their furniture.
2. **At the conclusion of the activity hold a class discussion.**
    - How is the furniture that we have built similar to the furniture we find around us?
    - How is the furniture we have made different from the furniture we find around us?
    - How can one make flimsy materials such as cardboard strong?
    - What things around us are made of cardboard?

EXTENSIONS

- Have students keep a list of things made from cardboard. Use Student Page 1.10.15 USING CARDBOARD.
- Have students keep a list of the different kinds of cardboard.

1.10.16 SEWING

OBJECTIVES

The students
- Sew materials for their cardboard house.
- Observe how materials are sewn.
- Observe different ways things are sewn.

BACKGROUND

This activity is used when materials need to be sewn. To introduce sewing, use coarse materials, such as burlap, yarn or string, and blunt needles. Other materials that students may sew include cloth, plastic, cardboard, and paper.

STUDENT ROLES

Seamstress
Tailor

MATERIALS

burlap
cloth
plastic
cardboard
paper
large needles
thread
yarn
lightweight string
Student Page 1.10.16 SEWING

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PRODUCTS

Curtains
Tablecloth
Books
Other sewn items
Completed Student Pages

PROCEDURES

1. **Introduce the activity when students have a need for sewn materials.**

   Demonstrate and have students practice
   - Threading a needle.
   - Knotting a thread.
   - Making different kinds of stitches as needed.
   - Making different kinds of seams as needed.

2. **Discuss the activity with the class.**

   Ask such questions as these:
   - What is a seam?
   - How can we make a seam strong?
   - How can we make our sewing look nice?
   - What kinds of materials are sewn together?
   - What kinds of things can you find that are sewn together?

EXTENSION

- Have students find examples of the kinds of things that are sewn and record their data on Student Page 1.10.16 SEWING.

1.10.17 WEAVING

OBJECTIVES

The students
- Observe the structure of cloth and other woven items.
- Make a weaving.
- Use weaving in furnishing their cardboard house.
- Observe the use of weaving in their environment.

BACKGROUND

This activity is designed as part of the cardboard house series. However, it can be used at any time. Materials that can be used are palm fronds, rags, twisted tissue paper, etc. The activity works out of a demonstration and inspection of existing woven materials.

STUDENT ROLE

Weaver

MATERIALS

examples of woven items
squares of burlap or other coarse-fiber materials
drawing paper
strips of paper
fibers for weaving
Student Page 1.10.17 WEAVING

PRODUCTS

Drawing of weaving
Paper mat
Woven items
Completed Student Pages

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PROCEDURES

1. **Suggest that there may be things like the floor, table, or walls that students may want to cover or decorate.**

   Indicate that one way to do this is to make a weaving. Show some examples of woven items.

2. **Have student investigate the structure of weaving by giving students small pieces of burlap or coarse-fibered cloth.**

   Have students
   - Remove some threads along one edge.
   - Draw a square to represent the cloths on Student Page 1.10.17 WEAVING.
   - Draw threads and the way that they run on the cloth.
   - Look to see how these two kinds of threads are woven together. Try to show this on their drawings.

   Discuss why they think threads are put together this way.

3. **Give students strips of paper to weave together like the cloth.**

4. **Demonstrate the weaving of rags or other materials as an introduction to making weavings needed for the cardboard house.**

5. **Have students groups decide on the weaving they need to do for their house and then make the weaving.**

6. **Discuss the weaving activity.**

   Some suggested questions are
   - Why is a weaving stronger than the threads that make it up?
   - How can small threads be made into large cloths?
   - What kinds of things do we find around us that are woven?
   - How is our weaving similar to the things that are commercially woven?
   - How is it different?

EXTENSIONS

- Have students keep a list of the different kinds of things made of woven materials.
- Have students keep a list of the different kinds of fiber used in woven materials.

1.10.18 WARMING AND COOLING THE HOUSE

OBJECTIVES

The students

- Observe how to warm a house by conserving heat.
- Observe how to cool a house by ventilation.
- Invent a way to warm a house.
- Invent a way to cool a house.
- List ways that we warm and cool houses.

BACKGROUND

This activity is used to solve the problem of a cardboard house that is too hot or too cold. It is introduced when the problem arises. It is a discovery activity. Body heat will quickly warm the house because of its size. This is especially true if the doors are closed since cardboard is a good insulator.

The teacher's role is that of building superintendent. All heating and cooling plans are to be cleared through you. In heating the house there will be safety issues that must be considered. Reject methods using burning materials, electrical heaters with open elements, or any other questionable technique.

Check carefully any inventions using water and ice since unpainted cardboard quickly collapses when wet.

One idea that can be tried for heating is the use of body heat and keeping doors and windows closed. Other ideas include using warm air from an energy source outside the house and putting the house in the sun or near a radiator. Ideas used for cooling require some sort of ventilation. All doors and windows can be opened or fans can be used.

STUDENT ROLE

Air conditioning engineer

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MATERIALS

thermometer
cardboard house
items as requested by students
Student Page 1.10.18 WARMING AND COOLING

PRODUCTS

A properly cooled and warmed house
Completed Student Pages

PROCEDURES

1. **When the cardboard houses get cold, introduce the possibility of heating to the students.**

   Some suggested questions are
   - How can we warm our house?
   - How do we warm the classroom?
   - How do we warm the place where we live?

2. **Have students invent ways of keeping their house warm.**

3. **When the cardboard houses get too warm, introduce the possibility of cooling.**

   Some suggested questions are
   - How can we cool our house?
   - How do we cool our classroom?
   - How do we cool the place where we live?

4. **Have students invent ways of keeping their house cool.**

5. **Summarize the activity with the students.**

   Some suggested questions are
   - How were the ways we kept our cardboard house warm the same as those we use in our homes?

- How were they different from the ways we keep our homes warm?

- How were the ways we kept our cardboard house cool the same as those we use in our homes?

- How were they different from the ways we keep our homes cool?

6. **Have students list or draw different ways to keep buildings warm and cool. Use Student Page 1.10.18 WARMING AND COOLING.**

1.10.19 LIGHTING THE HOUSE

OBJECTIVES

The students
- Observe ways to light houses.
- Invent a way to light a house.

BACKGROUND

This activity is introduced when students discover a need for more light in their cardboard house. Students observe how the classroom and their homes are lighted. Then they invent ways to light their house. The teacher is the building supervisor and approves any ideas for safety before they are implemented. Some possible student inventions may include skylights, larger windows, and portable lamps or flashlights.

STUDENT ROLE

Lighting engineer

MATERIALS

clear plastic bags or wrap
tape
scissors
other materials as requested by students
Student Page 1.10.19 LIGHTING

PRODUCTS

Well-lighted houses
Completed Student Page

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PROCEDURES

1. **When students find they need more light for some project in their cardboard house, begin the activity by having them observe the way the classroom and their homes are lighted.**

   Record observations on Student Page 1.10.19 LIGHTING.

2. **Discuss the students' observations about the ways buildings are lighted.**

   Some suggested questions are
   - How is the classroom lit?
   - How is your home lit?
   - How could we use these ideas to light our cardboard houses?
   - How could we use these ideas to increase the light in our cardboard houses?

3. **Have students invent ways to light their cardboard houses.**

4. **Summarize the activity with a class discussion.**

   Some suggested questions are
   - How are the ways we light our homes the same as the ways we lit our cardboard houses?
   - How were they different?
   - Which ways worked the best?
   - What are some other ways we could try to light our house?

1.10.20 SAFETY EQUIPMENT

OBJECTIVES

The students
- Discuss the need for classroom safety.
- Make plastic-bag raincoats.
- Invent protective aprons.
- Invent devices for handling hot objects.

BACKGROUND

This activity is used whenever new safety devices are needed. Safety is a constant focus in DASH. To raise the level of awareness about things that are potentially dangerous the students make their own protective equipment. They are responsible for determining when such gear should be used and what its limitations are in protecting them. This of course does ***not*** take the primary responsibility for safety from the teacher, but it does provide many hands and eyes all trained to watch for safety hazards.

Safety Team

In this activity a safety monitor or team is appointed each week to watch out for safety problems and alert the class when safety precautions should be taken. Make this a Responsibility Chart assignment.

Raincoats

DASH students have been making emergency raincoats from plastic bags since kindergarten. These can be made when a student does not have the proper covering to work in the rain. The students invent their own designs. Utility should be stressed. After use raincoats should be dried, folded, and stored for other emergency occasions.

Aprons

Students need plastic-bag aprons for work in the classroom and field. They can invent their own design. Utility is stressed. The aprons should be cleaned after use and stored.

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Hand Protection
Hot pads and other devices to handle hot materials can be invented by the students. These also should be cleaned and stored after use. Commercially available plastic gloves can be used for sanitation purposes. In some cases a plastic bag to cover the hands can be substituted.

Eye Protection
Use commercial goggles whenever eyes need to be protected.

Tool Safety
DASH 1 students are introduced to the use of several hand tools. Safe use of all tools should be discussed and demonstrated before use. Adult supervision is essential until the students become skilled and responsible in tool use. Thereafter, teachers need to be aware of student use of tools and prepared to take quick action when they are being used improperly. Parents can make an important contribution to supervision.

STUDENT ROLES

Safety officer
Inventor
Safety-conscious worker

MATERIALS

chart paper
markers
Responsibility Chart
heavy-duty plastic bags, 20–30 gal
waterproof tape
cloth scraps
Connections Book
Student Page 1.10.20 SAFETY EQUIPMENT

PRODUCTS

List of safety rules
Raincoats
Aprons
Devices to handle hot materials
Completed Student Pages

PROCEDURES

1. **Have the class develop a list of classroom safety hazards.**

   Help them include such ideas as
   - Slippery floors.
   - Hot things.
   - Things that can get into eyes.
   - Things that can be tripped over.
   - Sharp and pointed things in desks.
   - The way equipment is used.
   - Misuse of sharp tools.
   - Things that can fall over.
   - Wet clothes.
   - Clogged drains.
   - Clutter.
   - Blocked exits.

2. **Introduce and discuss the need for a safety monitor or team to remind the class about safety rules.**

   Have the students
   - Use their list to develop a set of class safety rules.
   - Add the safety monitor to the Responsibility Chart.
   - Write a job description for the safety monitor.
   - Revise the job description as necessary.

3. **When an activity requires protecting clothes, have the students invent aprons. Use the Inventor's Box and emphasize utility of design.**

Ask such questions as these:

- What materials can protective aprons be made out of?
  ✔ Work for agreement on the use of plastic.

- What should be done with the aprons after they've been used?
  ✔ Work to the idea of cleaning and storing them for later use.

4. **When an activity calls for going outside in the rain, have the students who have no raincoats invent them. Use the Inventor's Box and emphasize utility of design.**

   Ask such questions as these:

   - What can raincoats be made out of?
     ✔ Work for agreement on large plastic bags.

   - What precautions do you need to take when you put a plastic bag over your head?
     ✔ Get at the need for air holes.

   - What should be done with your raincoats after you use them?
     ✔ Work to the idea of drying and storing them for later use.

5. **When an activity requires students to handle hot materials, have them invent hot pads or other devices. Use the Inventor's Box.**

   Ask such questions as these:

   - What materials could be used to invent devices to handle hot things?
     ✔ Work toward the idea that the materials should not be destroyed at the temperature of the item being handled. Cloth or wood can be used at lower temperatures. At higher temperatures metal or ceramic materials should be used.

   - What should be done with the holders after they have been used?
     ✔ Work to agreement on cleaning and storing them for later use.

6. **When an activity requires protection of the and eyes, have the students use commercial goggles.**

7. **Have the students discuss and extend their ideas about safety. Record their ideas in the Connections Book.**

Ask such questions as these:
- Why is it important to know about safety?
- Who else needs to know about safety? Why?
- Where else might our classroom safety rules apply?
- Where else might you need to invent safety equipment?

EXTENSION

- Have students design other safety equipment such as foot coverings as needed.

MEASURING STRING SP 1.10.1

Name: ______________________

Date: ______________________

FROM WHERE?	TO WHERE?	HOW MANY METERS?

DASH

TESTING FOR WATER
SP 1.10.3

Name: ____________________

Date: ____________________

DATE	SCIENTIST	MATERIAL TESTED	RESULTS		VALIDATION TEST		
			YES WATER	NO WATER	WHO?	DATE	YES/NO

DASH

PLUMBING
SP 1.10.4

Name: ____________________

Date: ____________________

Draw and label a picture of your home plumbing system. Show how water comes in and goes out, the water meter, bathrooms, kitchens, water heater, main valve, etc.

WATER SYSTEMS
SP 1.10.5

Name: ____________________

Date: ____________________

Show how water gets from ____________ to ____________ .

DASH

BUBBLES IN WATER
SP 1.10.7

Name: ______________________

Date: ______________________

BUBBLE QUESTIONS	WHAT DID YOU DO?

DASH

BUBBLES
SP 1.10.8

Name: ______________________

Date: ______________________

PROPERTY	BUBBLES IN WATER	BUBBLES IN AIR

DASH

USING AIR
SP 1.10.9

Name: ____________________

Date: ____________________

Draw and label pictures of how air can be used.

DASH

FLOOR PLAN
SP 1.10.11

Name: ______________________

Date: ______________________

Make a sketch of the classroom floor plan. Include furniture, centers, etc. Show where the village will be located. Color your group's house red.

DASH

CARDBOARD
HOUSE PLAN
SP 1.10.12

Name: ______________________

Date: ______________________

Draw a picture of the final plans for your cardboard house. Include walls, roof, windows and doors. Be sure to put the measurements on your plan.

PAINTING
SP 1.10.14

Name: ______________________

Date: ______________________

Make a list of things that are painted.

1. ______________________

2. ______________________

3. ______________________

4. ______________________

5. ______________________

6. ______________________

7. ______________________

8. ______________________

9. ______________________

10. ______________________

DASH

USING CARDBOARD
SP 1.10.15

Name: ______________________

Date: ______________________

Make a list of things made out of cardboard.

1. ______________________
2. ______________________
3. ______________________
4. ______________________
5. ______________________
6. ______________________
7. ______________________
8. ______________________
9. ______________________
10. ______________________

SEWING
SP 1.10.16

Name: ______________________

Date: ______________________

Make a list of things that are sewn.

1. ______________________
2. ______________________
3. ______________________
4. ______________________
5. ______________________
6. ______________________
7. ______________________
8. ______________________
9. ______________________
10. ______________________

WEAVING
SP 1.10.17

Name: ______________________

Date: ______________________

Draw a picture to show how cloth is woven.

WARMING AND COOLING SP 1.10.18

Name: ______________________

Date: ______________________

WAYS TO WARM BUILDINGS	WAYS TO COOL BUILDINGS

DASH

LIGHTING
SP 1.10.19

Name: ______________________

Date: ______________________

Draw pictures of the ways your classroom and home get light. Label your pictures.

DASH

SAFETY EQUIPMENT
SP 1.10.20

Name: ____________________

Date: ____________________

Safety problem: ______________________________

Tell about or draw and label a picture of the safety equipment you made to solve the problem.

DASH

GRADE 1

SUPPORT MATERIALS

DASH

GRADE 1

START-UP ACTIVITIES & STUDENT PAGES

Grade 1

Start-Up Activities

DASH

Developmental Approaches in Science, Health and Technology

Curriculum Research & Development Group
University of Hawai‘i

Grade 1
Start-Up Activities

1. K.1.6 Using Our Senses
2. K.1.7 Same and Different
3. K.1.8 Physical Characteristics of Things
4. K.1.9 Functions of Things
5. K.1.10 The Working Dictionary and Working Definitions
6. K.1.12 The Connections Book
7. K.2.6 Moon Watch
8. K.2.7 Moon Phases
9. K.3.8 How Bugs Walk
10. K.3.9 Parts of Bugs
11. K.4.4 Growing Bean Sprouts

K.1.6 USING OUR SENSES

OBJECTIVES

The students
- use their senses to describe selected objects
- identify the different senses used in collecting the information
- relate properties of things to senses

BACKGROUND

USING OUR SENSES usually precedes Activities K.1.7 SAME AND DIFFERENT, K.1.8 PHYSICAL CHARACTERISTICS OF THINGS, K.1.9 FUNCTIONS OF THINGS, and K.1.10 WORKING DICTIONARY AND WORKING DEFINITIONS.

Observation and senses

This activity is designed to encourage the students to observe the commonplace things around them and to think about how they make their observations. Using song and body motion, they name objects, describe their properties, and identify the organs of sense they use.

Senses and properties

In USING OUR SENSES the students are introduced to the senses of sight, hearing, touch, smell, and taste. They associate these senses with their sensing organs—eyes, ears, skin, nose, and tongue and identify the properties of objects that can be sensed—color, sound, texture, temperature, odor, flavor, and so forth.

Use of song

There is strong evidence that musical and rhythmic forms of expression enhance memory. They also allow expression of emotion. For these reasons *DASH* often uses song, rap, rhyme, and chant. In this activity song is playfully used to get the students to recall what they have observed on the way to school.

Use of body motion

In addition the brain specially responds to body motion, and this provides another path for learning. Polynesian people used dance and chant to recount their history. Mimes use hands, bodies, and facial

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expressions as an alternative to speech to describe the world. Through pantomime the students can take advantage of kinesthetic learning and make experiences more lasting.

Help the students become inventive in their use of body motion and facial expressions. For example, degrees of loudness can be expressed by cupping or closing the ear. Pleasant or unpleasant odors can be expressed by breathing deeply or holding the nose, color by pointing to similarly colored objects, and so forth.

STUDENT ROLES

Observer
Reporter

MATERIALS

What Did You See on Your Way to School? song
Student Page K.1.6 WHAT I SAW ON THE WAY TO SCHOOL

PRODUCTS

Completed Student Pages

PROCEDURES

1. **Begin by singing a question to the students. Then have them sing the answer back while using body gestures to point to the organ of sense involved in observation. Have them use gestures to help describe the things they observed. See Fig. K.1.6. The song is sung to the tune of *London Bridge is Falling Down*.**

   Help the students do the following:
   - Sing their response.
   - Point to the part of their body (organ of sense) used in observing properties identified—eyes, ears, nose, and so forth.
   - Use body movements and facial expressions to help describe objects.
     ✔ Show shape, size, texture, sound, and odor with hands and body.

- Use the suggested verses below or invent your own in response to what the students identify.

WHAT DID YOU SEE ON THE WAY TO SCHOOL?

(Sung to the tune of *London Bridge Is Falling Down*)

TEACHER TO STUDENT
What did you see on your way to school?
Way to school, way to school,
What did you see on your way to school?
The way to school this morning.

STUDENT'S RESPONSE
I saw a .... on my way to school,
Way to school, way to school.
I saw a .... on my way to school,
The way to school this morning.

TEACHER TO STUDENT
Where did you see .... on the way to school? Etc.

STUDENT'S RESPONSE
I saw it on the .... on the way to school. Etc.

TEACHER TO STUDENT
What color was .... on the way to school? Etc.

TEACHER TO STUDENT
How tall was .... on the way to school? Etc.

TEACHER TO STUDENT
What did .... sound like on the way to school? Etc.

TEACHER TO STUDENT
What did .... smell like on the way to school? Etc.

TEACHER TO STUDENT
What did .... feel like on the way to school? Etc.

TEACHER TO STUDENT
What did .... taste like on the way to school? Etc.
(Use taste only if food is involved.)

Fig. K.1.6(1) The *What Did You See on the Way to School?* song

2. **Discuss reporting about things we see on the way to school.**

   Ask such questions as these:
   - Does it help you to describe or tell what a thing is using your body? How?

   - How do you think using our hands and body helps someone else understand what we mean?

   - Does it help you describe things with music? How?

3. **Discuss the senses and how they help us to tell about what we find or observe on the way to school.**

   Ask such questions as these:
   - How do you see things?
     ✔ Work to the idea that we see things with our eyes. Add that our eyes give us our sense of sight.

   - How do you hear things?
     ✔ Work to the idea that we hear things with our ear. Add that our ears give us our sense of hearing.

   - How do you feel things?
     ✔ Work to the idea that we feel things with our skin. Add that our skin gives us our sense of touch.

   - How do you smell things?
     ✔ Work to the idea that we smell things with our nose. Add that our nose gives us our sense of smell.

   - How do you taste things?
     ✔ Work to the idea that we taste things with our tongue. Add that our tongue gives us our sense of taste.

4. **Repeat the lesson over several days or weeks. Include as many properties as possible.**

   Include the following:
   - Sense of *sight* and associated properties
     Color
     Size
     Shape
     Pattern

- Sense of *hearing* and associated properties
  Pitch
  ✔ Get at high/low pitch
  Intensity or amount
  ✔ Get at soft/loud intensity and pain
  Beat
  ✔ Get at fast/slow beat

- Sense of *touch* and associated properties
  Feeling
  ✔ Get at rough/smooth, soft/hard, sharp/dull, and others

- Sense of *pressure* and associated properties.
  Weight
  ✔ Get at heavy/light and pain

- Sense of *temperature* and associated properties
  ✔ Get at hot/cold and pain

- Sense of taste and associated properties
  ✔ Get at sweet and sour, bitter and salty
  ✔ **CAUTION**: Ask the students about tastes only if the thing they are observing is food. Remind them that it is dangerous to taste things that are not foods.

- Sense of smell and associated properties
  ✔ Smells are described as being *like* something known—*like* fruit, perfume, foul odors, and so forth.

5. **After each session, discuss the properties of the things observed, the organ of sense used to detect the properties, and the name we give to the sense associated with the organ. (Color–eye–sight, sound–ear–hearing, and so forth.)**

EXTENSION

- Have the students lead the *What Did You See on the Way to School?* song.

DASH

WHAT I SAW ON THE WAY TO SCHOOL
SP K.1.6

Name ______________________

Date ______________________

Draw a picture of something you saw on the way to school.

①	②
③	④

Put an X on each of the senses you used.

	SEE	SMELL	HEAR	TASTE	TOUCH
1					
2					
3					
4					

K.1.7 SAME AND DIFFERENT

OBJECTIVES

The students
- classify items according to their similarities and differences

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BACKGROUND

SAME AND DIFFERENT introduces classification of objects. It builds on Activity K.1.6 USING OUR SENSES and should be followed by Activities K.1.8 PHYSICAL CHARACTERISTICS OF THINGS, K.1.9 FUNCTIONS OF THINGS, K.3.4 LIVING AND NOT-LIVING, and K.3.5 ANIMALS AND PLANTS.

SAME AND DIFFERENT is also part of a series leading to the development of working definitions in Activity K.1.10 THE WORKING DICTIONARY AND WORKING DEFINITIONS. Notice that *DASH* activities are often part of more than one developmental series.

Focus Book

The students begin exploration of things that are the same and different by using the Focus Book *Same and Different*. The story is about two children who have similar likes and pleasures but because of gender wear different party clothes. The Focus Book provides an opportunity to talk about things that are different and things that are alike or about the same.

Same and Different Game

The students next play the *Same and Different Game* in which they sort items into six or more different major categories. Each major category is made up of some set of common classroom items such as paper clips, books, pencils, and so forth. Objects in a category have the same form and function. The *form* of an object refers to its appearance, what it is made of, and its parts and their organization. The *function* of an object refers to what it does or is used for.

Building a master collection

The same master collection of items in this activity can be used in Activities K.1.8 PHYSICAL CHARACTERISTICS OF THINGS and K.1.9

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FUNCTIONS OF THINGS if it is large enough to have at least one item per student. The master collection needs to have six or more major categories, each with two component categories. One of the two component categories should have items that all look the same. The other component category should have the same kind of items, but they should look different from all the other items. For example, *lead pencils*, the major category, could have a *same pencils* category with three brand-new white pencils and a *different pencils* category with three used, different-colored lead pencils. See the chart in Fig. K.1.7.

SUGGESTED ITEMS FOR A MASTER COLLECTION OF GAME ITEMS

Major Category: Pencils ***Category: new lead pencils*** that look the same (3 items) ***Category: used lead pencils*** that look different from each other and all other pencils for example different colors, different lengths, etc. (3 items)	**Major Category: Paper Clips** ***Category: new paper clips*** that look the same (3 items) ***Category: used paper clips*** that look different from each other and all other paper clips for example different colors, sizes, etc. (3 items)
Major Category: Books ***Category: new books*** with the same title (3 items) ***Category: used books,*** each with a different title (3 items)	**Major Category: Rulers** ***Category: new rulers*** that look the same (3 items) ***Category: used rulers*** that look different from each other and all other rulers for example different colors, materials, etc. (3 items)
Major Category: Paper ***Category: new sheets*** of paper that look the same (3 items) ***Category: used sheets*** of paper that look different from each other and all other sheets of paper for example different colors, sizes, etc. (3 items)	**Major Category: Crayons** ***Category: new crayons*** that look the same and are the same color (3 items) ***Category: used crayons*** that look different from each other and all other crayons for example different colors, lengths, etc. (3 items)

Fig. K.1.7 Chart of suggested items for the Same and Different master collection

Kinds of things or categories
The teacher and students work together to create category names such as *pencils, rulers, paper clips*, and so forth as two or three different kinds of things or items are drawn from a container holding the master collection. They then match other items with existing categories or create new categories when different kinds of items are presented. They invent a logo to represent each category, for example, a picture of a pencil or a ruler.

Skill development
If a large number of students have difficulty in classifying, play the game several times before going on to Activity K.1.8 PHYSICAL CHARACTERISTICS OF THINGS where the skills of classifying are refined.

To reinforce the idea of classification, set up a classification center. After students have successfully classified items in the center, they can become "experts" who check other students' classification. The teacher needs to be involved only when there are differences of opinion on classification schemes.

STUDENT ROLES

Classifier
Observer

MATERIALS

Focus Book *Same and Different*
collection of items
Post-it notes
Student Page K.1.7 SAME AND DIFFERENT

PRODUCTS

Completed *Same and Different Game*
Completed Student Pages

PROCEDURES

1. **Read the Focus Book *Same and Different.***

   Ask such questions as these:
   - What were some things the children in the story shared?

   - How were the children the same?

- In what ways were the children different?

- Do you think that they were the same and different in other ways? What ways?

2. **Introduce the *Same and Different Game* using items from the master collection. Keep the items in a container so that they can be seen only when pulled out. Have the students focus on the major category names (*pencils, paper clips, paper*, and so forth). At this time do not worry about differences between items (old and new or other differences) in the major category.**

- Pull an item from the container and help the students give it a name.
  ✔ Ask, What is this? or What do we call this? The name they suggest will usually tell what kind of thing the item is and be its category name.

- Draw a box or circle on the floor or on chart paper and put the item in it.

- Help the students invent a logo to represent the item.
  ✔ They could, for example, draw a picture of a pencil or a paper clip, and so forth.
  ✔ Logos can be drawn on Post-it notes.

- Write the category name so that the students get continuing reinforcement of the importance of writing.

- Show the students another item and ask them whether it is the same or different from the one already out in the circle or box.
- If it is different, draw the item in a different box or circle. Give the item a name and a logo.

- If it is the same, place it in the box with similar objects.
  ✔ Start using the term *category* to describe the box or circle and the items in it.

- Ask why they put the item where they did?
  ✔ Usually students will say they look alike or do the same things.

- Ask why they didn't put the items in some other category.

- Continue until the students are reasonably fluent with the ideas of *same, different,* and *category.*
  ✔ If the students have difficulty, repeat to the game in the next day or so.

3. **Summarize the activity and then have the students complete Student Page K.1.7 SAME AND DIFFERENT.**

   Ask such questions as these:
   - What do you mean when you say that something is in a *category?*
     ✔ Work to the idea that the thing shares a name with other things in the category and is like them.
     ✔ Work to such things as new, old, and used pencils are in the *pencils* category; new, old, and beat-up cars are all in the *cars* category. In each case items of the category share some properties and do the same thing.

EXTENSION

Start a Sameness Chart.
- Tape an object such as a pencil to chart paper and every day have a student add a different object that is like it in some way.

- Have the student tell how the object is like the pencil and suggest a category name that would fit both objects. For example, *wooden things* would fit both a stick and a pencil; *writing tools* would fit both a pen and a pencil.

- To stretch the imagination of the students, add an object yourself.

DASH

SAME AND DIFFERENT
SP K.1.7

Name ______________________

Date ______________________

Draw some shapes that are the same.

Draw some shapes that are different.

K.1.8 PHYSICAL CHARACTERISTICS OF THINGS

DASH

OBJECTIVES

The students
- are introduced to two-category (dichotomous) classification
- classify objects by their physical properties

BACKGROUND

This activity is part of a series designed to help students develop classifying skills. It should follow Activities K.1.6 USING OUR SENSES and K.1.7 SAME AND DIFFERENT and precede Activities K.1.9 FUNCTIONS OF THINGS, K.3.4 LIVING AND NOT-LIVING, and K.3.5 ANIMALS AND PLANTS.

PHYSICAL CHARACTERISTICS OF THINGS is also part of a series leading to the development of working definitions in Activity K.1.10 WORKING DICTIONARY AND WORKING DEFINITIONS.

Properties

Earlier, the students were introduced to the concept of properties in Activity K.1.6 USING OUR SENSES where they described things they saw on the way to school. In Activity K.1.7 SAME AND DIFFERENT they identified different kinds of things in a master collection—lead pencils, rulers, and so forth and told how they were alike. Here in PHYSICAL CHARACTERISTICS OF THINGS the students use the same master collection and separate its items into categories, using the physical properties of size, shape, color, and so forth. To do this they use a two-category or *dichotomous* system for sorting and classifying.

Two-category classification

Scientists use this same dichotomous system in their sorting and classifying. They inspect a collection of items and divide the collection into two categories. One category will have items with one or more defining properties that the items in the other category don't have. This process of division continues until all items in a collection have been

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placed in distinctive categories. All items in a category have the same defining properties as all other items in it.

Student-Sorting Game

To give the students a feeling for how to classify, start with the *Student-Sorting Game*. Select four students and put them in the collection *All Students*. For example *All Students* might be Jan, Jill, Jo, and Jack. Then divide *All Students* into two categories—*Jan* and *Not Jan*. Next divide the *Not Jan* students into two more categories—*Jill* and *Not Jill*. Continue the process until *Jo* and *Jack* have their own separate categories. See Fig. K.1.8 (1).

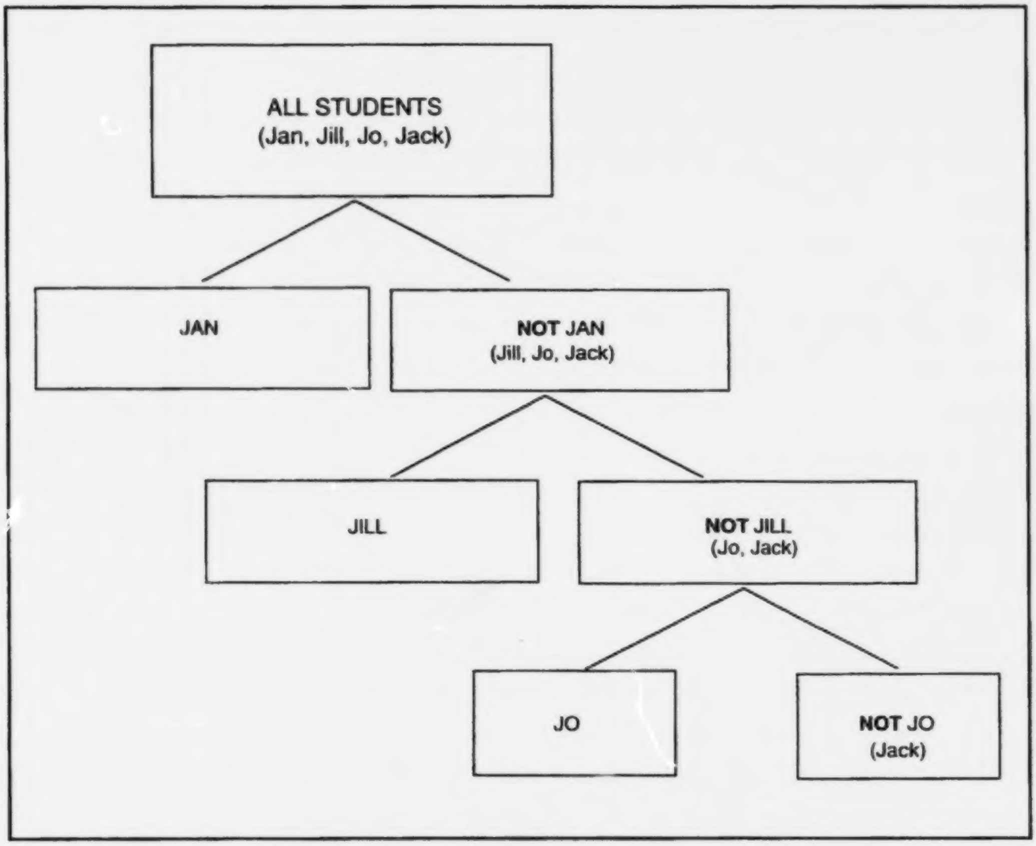

ALL STUDENTS
(Jan, Jill, Jo, Jack)
JAN
NOT JAN
(Jill, Jo, Jack)
JILL
NOT JILL
(Jo, Jack)
JO
NOT JO
(Jack)

Fig. K.1.8(1) A classification tree showing the steps in the classification of students in the *Student-Sorting Game*.

Item-Classification Game

A second game, the *Item-Classification Game*, uses the items from the master collection put together for Activity K.1.7 SAME AND DIFFERENT and has the students classify items by their physical properties. Work with the students through the classification of at least one of the major categories such as *All Pencils*.

Follow the process used in the *Student-Sorting Game*. On a table or the floor put all the items in a single major category. *All Pencils* is the major category in Fig. K.1.8(2). Successively, the category *All Pencils* is divided into *White pencils* and *Not-white pencils*. Then *Not-white pencils* is divided into two categories —*Yellow pencils* and *Not-yellow pencils*. Again continue the division until the items can no longer be separated.

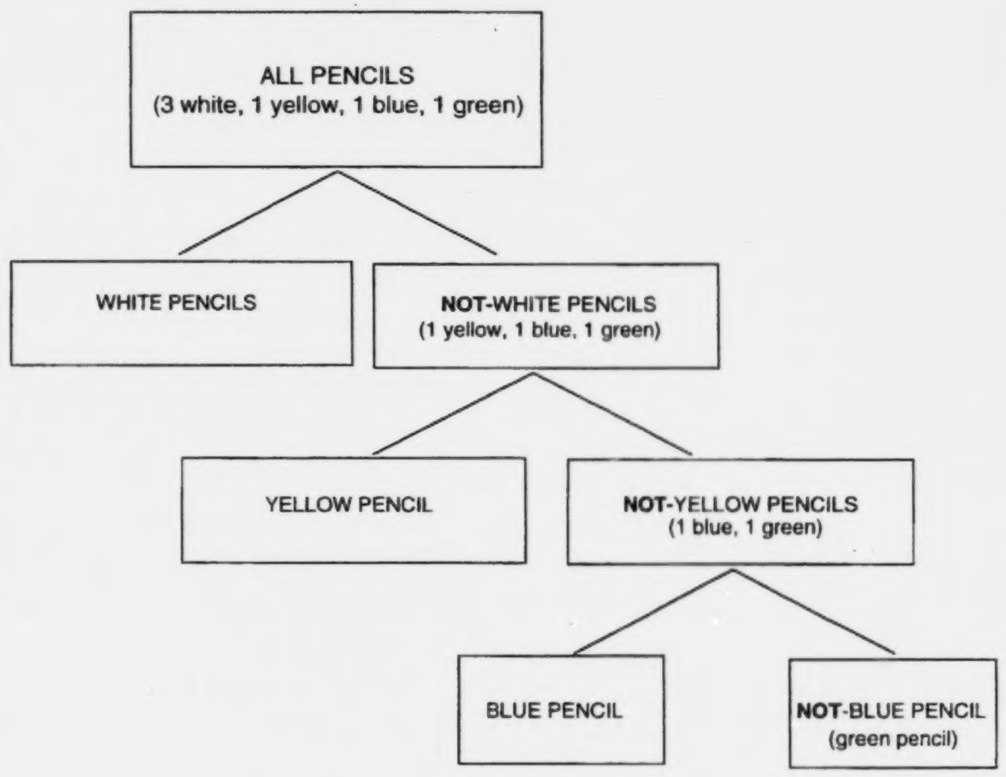

ALL PENCILS
(3 white, 1 yellow, 1 blue, 1 green)
WHITE PENCILS
NOT-WHITE PENCILS
(1 yellow, 1 blue, 1 green)
YELLOW PENCIL
NOT-YELLOW PENCILS
(1 blue, 1 green)
BLUE PENCIL
NOT-BLUE PENCIL
(green pencil)

Fig. K.1.8(2) Classification tree showing the steps in the classification of pencils.

At each step leave a record of the categories to show what was done. To record them, draw a box or circle around the categories and give them names such as *All pencils*, *White pencils*, *Not-white pencils*, and so forth. To help the students remember the categories, logos can be used in addition to words. For example, a series of lines might be the logo for *All Pencils*, a white line for *White pencils*, a white line with a black diagonal line through it for *Not-white pencils*, and so forth.

After one or two rounds of the game, have the students work in small groups to classify items in other major categories.

Showing steps in the classification
The students are asked to draw lines between the category boxes in the different games to show the steps they go through in their classi-fication and create a classification trees. Using Student Page K.1.8 CLASSIFICATION TREE, the students make a record of one classification tree showing the steps in one of the games.

STUDENT ROLES

Taxonomist
Classifier

MATERIALS

chalk to write on floor
chart paper
markers
master collection of items from Activity K.1.7 SAME AND DIFFERENT
Student Page K.1.8 CLASSIFICATION TREE

PRODUCTS

Classification Trees
Completed Student Pages

PROCEDURES

1. **Have the students play the *Student-Sorting Game*.**

- Draw a large circle on the floor and give it the name *All Students*.

  ✔ Ask for volunteers and select 4.

  ✔ Have the 4 students write their initials in the circle and then stand in it.

  ✔ Announce that this is the *All-Students* circle and label the circle.

- Draw another circle outside the big circle. Put the initials of Student #1 in the circle.

  ✔ Ask, Who is Student #1?

  ✔ Have Student #1 stand in the circle and announce that this is *Student #1's* circle.

  ✔ Ask whether the original *All-Students* circle still has the right name now that Student #1 is not in it.

  ✔ Work to the idea that we need a new circle that does *not* include Student #1.

- Draw a *Not-Student #1 circle* at the side of the *Student #1 circle*. (See Fig K.1.8(1). Have the remaining students put their initials in the new circle and stand in it.

  ✔ Ask, What circle is this?

  ✔ Work to the response that it is the *Not-Student #1* circle.

- Draw another circle below the *Not-Student #1* circle. Put the initials of Student #2 in the circle.

  ✔ Ask, Who is Student #2?

  ✔ Have *Student #2* stand in the circle and announce that this is *Student #2's* circle.

  ✔ Ask whether the *Not-Student #1* circle still has the right initials now that *Student #2* is not in it.

  ✔ Work to the idea that we need a new circle that does *not* include *Student #2*.

- Draw a *Not-Student #2* circle at the side of the *Student #2* circle. (See Fig K.1.8(1). Have the remaining students put their initials in the new circle and stand in it.

  ✔ Ask, What circle is this?

  ✔ Work to the response that it is the *Not-Student #2* circle.

- Continue the process until all four students have their own category circle. See Fig K.1.8(1).

2. **Repeat the steps in the sorting with other students. Ask the original group of 4 students to help others.**

3. **Make a classification tree by drawing lines to show the steps in the sorting of students. See Fig K.1.8(1).**

4. **Help the students apply the classification technique to sorting the items in one of the major categories in the master collection from K.1.7 SAME AND DIFFERENT. Introduce the *Item-Classification Game*. See Fig K.1.8(2) for an example using pencils. Place all items on the table and go through the classification with the students. Box-in or circle all categories to record the steps in the process as in the *Student-Sorting Game.***

   Ask such questions as these:
   - How did you separate one category of things from another?
     ✔ Work to the idea of using different properties of items.

   - What kinds of properties did you use?
     ✔ Get at such things as differences in shape, color, materials, weight, size, and others.
     ✔ Give these things the name *physical properties*.

   - How is this classification similar to the *Student-Sorting Game?*
     ✔ Get at the idea that they are the same except that one uses people and the other uses common classroom tools.

5. **Organize the class into teams of 4–5 students. Give each team one of the major categories of the master collection from K.1.7 SAME AND DIFFERENT. Help them play the *Item-Classification Game.***

   Have the students do the following:
   - Divide their major category into two new categories so that the items in one new category have one or more properties that the items in the other category do not have.

   - Draw boxes and create identifying logos to represent the categories of items.

- Continue the subdivision as far as possible.

6. Help the students record a classification tree from one of their games on Student Page K.1.8 CLASSIFICATION TREE. Have them put logos in the boxes and draw lines to show the steps.

EXTENSION

- Put a collection of four or five books on a learning center table and have a different group of students reclassify them in a different way each day. Identify each book with a logo.
  ✔ Have the students draw a classification tree and post it at the center to show how their classification is different from those done previously.
  ✔ At the end of each day have the students report on their classification and the properties they used.

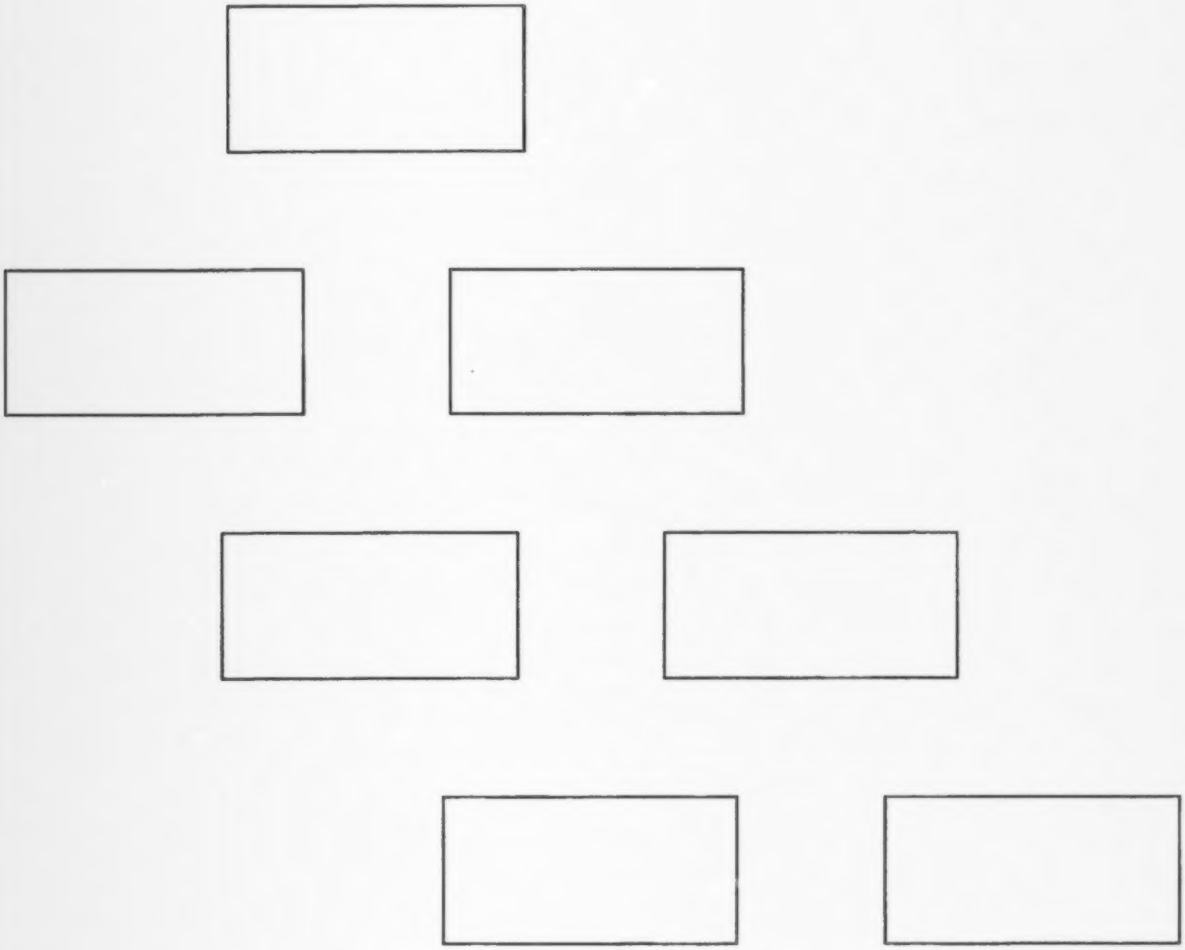
DASH

CLASSIFICATION
TREE
SP K.1.8

Name ______________________

Date ______________________

Show how you classified your collection.



K.1.9 FUNCTIONS OF THINGS

OBJECTIVES

The students
- identify functions of items
- classify items by their functions

BACKGROUND

FUNCTIONS OF THINGS should follow Activities K.1.6 USING OUR SENSES, K.1.7 SAME AND DIFFERENT, and K.1.8 PHYSICAL CHARACTERISTICS OF THINGS and precede Activities K.1.10 THE WORKING DICTIONARY AND WORKING DEFINITIONS, K.3.4 LIVING AND NOT-LIVING, and K.3.5 ANIMALS AND PLANTS.

In FUNCTIONS OF THINGS the students use the property of *function*, what a thing is used for or does, to classify items in the master collection of items from Activity K.1.7 SAME AND DIFFERENT.

Function Game

Classification is like a puzzle with several solutions. In practice rounds of the *Function Game* the students work with the teacher to develop an idea of *function*, what a thing does or is used for. Together they classify items based on their functions using the same techniques worked out when they classified things by their physical characteristics.

In the practice rounds the game is played with one item from each of four of the major categories. These are put on the table, and the students find a function name that will fit all items. For example: for a collection of a lead pencil, ruler, crayon, and sheet of paper the function name could be *things used in drawing* or *things used at school.* The students then divide the collection into a pair of categories, labeling one category of items as having a particular function and the other as not having it. For example, *a thing used in measuring* (a ruler) and *things not used in measuring* (all other items) might be used. Logos as well as words can be used. To identify the function of the items, a hand can be added to the logo for the item. See Fig. K.1.9 (1).

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Item	Possible Functions	Possible Logos
Book	To read, to hold printed words and pictures	Book with a hand
Crayon	To color paper or melt into candles	Crayon with a hand
Paper	To write on or to fold into paper airplanes	Paper with a hand
Paper clip	To hold paper together or to weight a string	Paper clip with a hand
Lead Pencil	To write on paper or to punch holes	Lead pencil with a hand
Ruler	To measure distance or draw lines	Ruler with a hand

Fig. K.1.9(1) A list of some possible item functions and logos

With the teacher, the students separate the remaining three items into function categories. For example, one category might be labeled *things used to write on* (paper) and the other, *things not used to write on* (crayons and lead pencils). This process is continued until all items are in separate categories. See Fig. K.1.9(2).

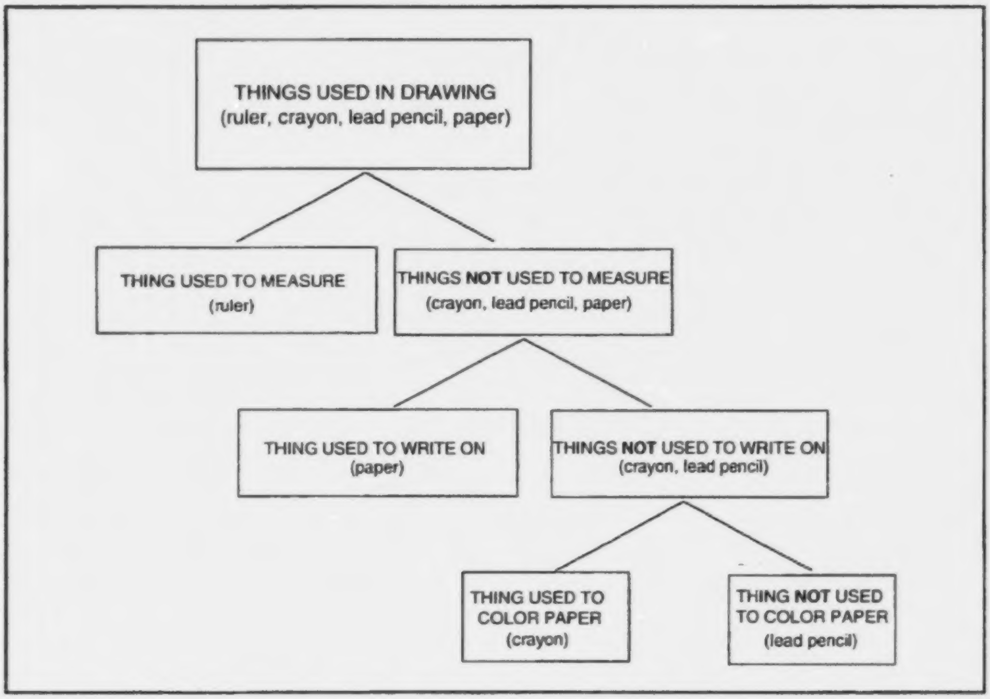
THINGS USED IN DRAWING
(ruler, crayon, lead pencil, paper)
THING USED TO MEASURE
(ruler)
THINGS NOT USED TO MEASURE
(crayon, lead pencil, paper)
THING USED TO WRITE ON
(paper)
THINGS NOT USED TO WRITE ON
(crayon, lead pencil)
THING USED TO COLOR PAPER
(crayon)
THING NOT USED TO COLOR PAPER
(lead pencil)

Fig. K.1.9(2) A classification tree produced in the *Function Game*

After one or two practice rounds, the students are provided with single items from four major categories of the master collection. They work in teams of 3–4 students to create function categories that allow them to sort the items as they did in the practice rounds.

STUDENT ROLES

Taxonomist
Classifier

MATERIALS

chart paper
master collection of items from Activity K.1.7 SAME AND DIFFERENT
Student Page K.1.9 FUNCTIONS OF THINGS

PRODUCTS

Classification tree about function
Completed Student Pages

PROCEDURES

1. **Use the master collection of items from K.1.7 SAME AND DIFFERENT to play one or two practice rounds of the *Function Game* with the class. Put four items from four different major categories on chart paper.**

   Ask such questions as these:
   - What do you use these things for?

     ✔ Get at such things as they use them as classroom tools, use them to do work at school, use them as tools in an office, and use them as things to draw with.
   - Does anyone know a word for the *uses of things*?

     ✔ Take students' suggestions and work to the idea of *functions*.

     ✔ Draw a box or circle around the items and label the collection with a common function.

     ✔ Create a logo for the function and put it in the box or circle. A hand added in a logo can represent function. A logo for *used as school tools* might be a hand in a school house; a logo for *used as drawing tools* might be a picture with a hand,

- Can you divide these things into two categories so that things in one category have a special function and things in the other category do not have that function?
  ✔ Discuss possible divisions. If the students do not come up with an idea, suggest one yourself.
  ✔ Draw boxes or circles around the categories and help the students identify them with functions and logos.
  ✔ A logo for the *not used* category can be the *used as* category logo with a diagonal line through it as in no smoking signs.
  ✔ Continue the subdivision until each kind of item has its own labeled function box.

- Can someone show us the steps you have gone through?
  ✔ Help the volunteer draw lines between the boxes or circles, creating a classification tree of functions.

2. **Organize the class into teams of 4–5 students. Give each team one item from four different major categories and a sheet of chart paper on which to draw their classification tree showing the steps they have gone through. Have them play the *Function Classification Game.***

Help the students do the following:

- Give their total collection a function category name.
  ✔ It may be the same as the one used in the practice round.

- Divide their collection into categories as in the practice round and draw boxes or circles around each category.

- Identify the different functions with logos.

- Continue the subdivision until each item has its own function category.

- Create a classification tree by drawing connecting lines to show the steps.

3. **Summarize the games.**

Ask such questions as these:

- Where have you seen a tree like the one you have just created before?

✔ Bring out the *Student-Sorting Game* and Physical Properties classification trees from Activity K.1.8 PHYSICAL CHARACTERISTICS OF THINGS.

- How are these trees alike?
  ✔ Get at the idea that they all show the steps used to sort or classify items by putting them into categories.

4. Have the students complete Student Page K.1.9.

EXTENSION

Start a Functions Chart

- Tape an object such as a pencil on chart paper and each day have a student suggest a different function that the pencil can have.
  ✔ Have them draw a logo to show the function. Logo drawing makes an exciting art lesson.
  ✔ To stretch the imagination of the students, add a function yourself. This might be to punch holes in paper, to use as a temporary bookmark, and so forth. An automatic pencil with a clip might be used as a temporary paper clip.

DASH

FUNCTIONS OF THINGS
SP K.1.9

Name ____________________

Date ____________________

Draw pictures of things you can use to write with.	Draw pictures of things you can use to measure other things.
Draw pictures of things you can use to hold things together.	Draw pictures of things you can use to write on.

K.1.10 THE WORKING DICTIONARY AND WORKING DEFINITIONS

OBJECTIVES

The students
- practice making working definitions
- start to compile a working dictionary

BACKGROUND

THE WORKING DICTIONARY AND WORKING DEFINITIONS draws together work from Activities K.1.6 USING OUR SENSES, K.1.7 SAME AND DIFFERENT, K.1.8 PHYSICAL CHARACTERISTICS OF THINGS, and K.1.9 FUNCTIONS OF THINGS. The Working Dictionary is one of the devices used in *DASH* to keep records of learning progress. Other record-keeping devices include the Learning Calendar, the Science Record Book, the Wonder and Discover Book, the Connections Book, and the Concept and Skill Inventory.

Working definitions

Scientific progress relies on operational or *working definitions* that describe scientists' current understanding of concepts or terms. These definitions are called "working definitions" because they allow the work of science to go on. It is understood that such definitions may be changed or modified in the future.

Students' definition

Research on children's development of definition indicates that the ideas they have about the world are constantly changed or modified by experience. *DASH* has called on these findings for guidance and therefore uses working definitions to support the students' continual shaping and reshaping of concepts and ideas.

A record of working definitions gives students a way to keep track of their evolving thinking. Working definitions provide teachers with a window into the students' grasp of ideas. There should be a review of previous definitions whenever already-defined concepts re-emerge. Definitions can be added to or changed in the review process.

Focus Book

The Focus Book *The Friendly Shape* can be used to give the students a sense of working definitions. In the story an imaginary spaceship lands on a planet and finds different things that have the same rectangular form it has. It also finds functions that help give these rectangular objects their definition.

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Spaceship's model definitions

In *The Friendly Shape*, the spaceship makes working definitions about objects that it encounters. In its definitions the spaceship includes a *category name* (bus, TV, theater, and so forth); the object's *functions*, what it does or what its uses are; and its *forms*. Forms involve the *physical properties* of things such as their shape, size, and sensory properties (color, texture, sound); and the *materials* and *parts* of which the things are composed. Working definitions in *DASH* are developed around the basic model of the spaceship's definitions. For example, the spaceship says a *bus* (name) is a *rectangular object* (form) that has *wheels and windows* (form) and *carries people* (function).

Evolving definitions

Beginning working definitions may include only a category name and the thing's functions; for example, *Living things grow, reproduce, and use water or need water.* Just as commonly, a beginning working definition may include only a category name and the thing's forms; for example, *Living things are made of wood or meat.* A more advanced working definition would join these pieces: *Living things* (category name) *are made of wood or meat* (forms) and *grow, reproduce, and use water* (function). Beyond this simple model, a maturing working definition might also include examples, synonyms, pictures or diagrams, and other information. Pictures and drawings in particular greatly enhance deeper understanding of a working definition.

The Working Dictionary

The Working Dictionary is most often a book with blank pages, frequently in loose-leaf or big-book format. It is used to keep a record of definitions. It is suggested that a single page be devoted to each concept or term defined so that ideas can be added or changed. Entries should be dated. Initials of major student contributors can be added to help you in assessment of student understanding. Working definitions *can include incorrect information* since they undergo regular re-evaluation when corrections can be made. This is how science operates—it is always growing and refining and sometimes changing its ideas.

Illustrating the dictionary

Only a few kindergarten students will be able to read or enter definitions in the Working Dictionary. The teacher will need to keep the record and read it to the students when definitions are needed. If the students illustrate the dictionary, it will help them find and remember the definitions.

STUDENT ROLE

Lexicographer

MATERIALS

Focus Book *The Friendly Shape*
chart paper
markers
Student Page K.1.10 WORKING DEFINITIONS

PRODUCTS

Working Dictionary
Completed Student Pages

PROCEDURES

1. **Read and discuss the Focus book *The Friendly Shape.***

   Ask such questions as these:
   - What was the shape of the spaceship?
   - Why did the spaceship say it liked the planet?
   - Why did the spaceship think it knew all about the planet?
   - In what ways are the bus and spaceship the same or alike?
   - In what ways are the bus and spaceship different or not alike? What are the differences?
   - What can the bus and spaceship do that are the same?
     ✔ Use the term *function* to mean what a thing does or is used for.
   - What functions of the bus are different from the functions of the spaceship?
   - According to the spaceship, what is a bus?
     ✔ Repeat what the spaceship says about the bus.
     ✔ The bus is a rectangle that carries people.
     ✔ Point out that this is the spaceship's *working definition* for a bus.

2. **Help the students tell how the spaceship defines or tells what a thing is. Its working definitions include a *name* (bus, TV, lunch box, and so forth), a *function* (what the thing does or how it is used), and its *form* or shape and other properties.**

Ask such questions as these:

- What does the spaceship call the things that it meets?
  ✔ Work to the idea that it calls them by their names—bus, theater, TV, lunch box. These are kinds or major categories of things.
  ✔ Write the word *name* or *category* on the board.

- What does it say about what they do or are used for?
  ✔ Review what the spaceship says about the function of the different things.
  ✔ Write the word *function* on the board.

- What does it say about the form or shape and other properties?
  ✔ Review what the spaceship says about shape and other properties.
  ✔ Write the word *form* on the board.

3. **Have the students complete Student Page K.1.10 WORKING DEFINITIONS. Ask them to draw a picture of an object from its working definition and tell what the object could be.**

The following are some suggested working definitions:

- The object is box-shaped, has drawers, and you put clothes in it.
  ✔ A dresser.

- The object is rectangular, has lines and three holes on one side, is made of paper, and you can write on it.
  ✔ A piece of notebook paper.

- The object is box-shaped, has a door, and you put dirty dishes it to be washed.
  ✔ A dishwasher.

- The object is rectangular, has a pattern on it, and is used to cover a bed.
  ✔ A quilt, blanket, or sheet.

4. **Have the students make new drawings. Have them show their drawings and ask the class to define the objects drawn.**

Help them include the following:

- Name.

- Function—what it does or is used for.

- Form—its appearance.

5. **Introduce the Working Dictionary to the students by making a working definition for a word, term, or concept. Include the kind or category name, functions, and forms of the thing defined.**
6. **At the end of the school year store the Working Dictionary in the library for the students to build on to next year.**

EXTENSION

- Have the students write their own class story about the continuing adventures of the Working Definition Spaceship.

DASH

WORKING DEFINITIONS SP K.1.10

Name ____________________

Date ____________________

K.1.12 CONNECTIONS

OBJECTIVES

The students
- find connections between what they are learning in school and what they are learning at their home and in the community
- find connections between the things they are learning in school

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BACKGROUND

The Connections Book is another of many devices used in *DASH* to keep records. Others include the Learning Calendar, the Science Record Book, the Working Dictionary, the Wonder and Discover Book, and the Concept and Skill Inventory. Of these, the Connections Book keeps a running log of student understanding of the ways concepts and skills are connected to things known and things learned inside and outside school. In kindergarten it is a picture book with connecting words relating things, events, and people.

Initial use of the Connections Book can be time-consuming. Therefore, it is suggested that at the kindergarten level it be used in schools where *DASH* is the organizing focus of the curriculum. The Connections Book will be used at all other levels but may be omitted in *DASH K.*

Function of the Connections Book

Often students have a difficult time associating what they are learning in school to their home and to other outside-of-school environments. The purpose of the Connections Book is to provide a stimulus to look for connections, relationships, and applications. Particularly in the early years, beware of overuse. Connections can also be made on the Learning Calendar and in the Working Dictionary.

When to start the Connections Book

The Connections Book can be introduced anytime the students seem to have a fairly good grasp of a concept of such things as *pets* or *responsibility*. Ask the students how the concept is connected to other things they have done or seen in or out of school. If, for example, the concept of pets is the focus of discussion, the students might connect pets with feeding, watering, exercising, playing with, grooming, and

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cleaning their pets at home. This is also a time to make connections with the world of work—the pet care industry, sales, veterinary medicine, and so forth. It is a time to ask who uses or needs to know about the things we have studied. The Connections Book can be used throughout the year whenever new concepts and skills can be related to the students' broader world.

Reviewing the Connections Book
The Connections Book should be reviewed periodically. This allows students to add connections they have found between *DASH* concepts within the different clusters, with other subject areas, and with things outside school. This review activity can be the basis for fascinating illustrated stories.

Home involvement
Student Page K.1.12 HOME CONNECTIONS is designed to involve parents in helping their children make connections between things learned in school and things learned outside school. Encourage parents to add written descriptions to the students' drawings. When students make connections, have them bring in their HOME CONNECTIONS Student Pages and give them new pages. The pages can be added to the class Connections Book or to their Science Record Books.

Storing the Connections Book
Ideally the class Connections Book will be stored in the library at the end of the school year so that teachers and students will have access to it in *DASH 1*.

STUDENT ROLES

Commentator
Philosopher

MATERIALS

chart paper
markers
oak tag
Student Page K.1.12 HOME CONNECTIONS

PRODUCTS

Connections Book
Completed Student Pages

PROCEDURES

1. **Discuss the use of the Connections Book with students using a concrete example of connected ideas, for example responsibility.**

   Ask such questions as these:
   - Where else besides school do you have responsibilities? What are they? How are they like your responsibilities at school?

   - Who else has responsibilities? Do people who work in the fire department, police department, hospital, and so forth have responsibilities? What are their responsibilities? How are they like your responsibilities at school?

2. **Help the students draw pictures showing their connections and add whatever language is needed to describe the connections. Be sure the student's name and the date are on each contribution. Put the drawings in the Connections Book.**

3. **Help the students review and add to the Connections Book periodically.**

   Ask such questions as these:
   - Has anyone discovered any more ways that the ideas we already have recorded can be used? Who are the people who use these ideas this way? What are they?

   - Are there other ideas we should put in the Connections Book? What are they?

4. **At the end of the school year store the Connections Book in the library as a resource for first-grade teachers and students.**

EXTENSION

- Use Student Page K.1.12 HOME CONNECTIONS to involve parents in helping their children make connections between things learned in school and their application outside of school.

DASH

HOME CONNECTIONS SP K.1.12

Name ______________________

Date ______________________

Draw and label some pictures of places you have observed __________ .

Draw and label some pictures of how we use __________ .

K.2.6 MOON WATCH

OBJECTIVES

The students
- record and report their observations of the moon's cycle
- count the days from one full moon to the next

BACKGROUND

MOON WATCH should follow Activities K.1.1 THE LEARNING CALENDAR, K.2.2 BEGINNINGS, K.2.3 ENDINGS, K.2.4 DAY AND NIGHT, and K.2.5 DAYS, WEEKS, AND MONTHS and precede K.2.7 MOON PHASES and K.2.9 CLOCKS AND CALENDAR. In MOON WATCH the students observe and count the number of days between full moons.

Astronomical cycles

The students used Earth's sunlight cycle in K.2.4 DAY AND NIGHT to develop a working definition of daytime and nighttime and to build a clock. In this activity, they watch the sky during the day and night to see whether the moon has a natural cycle. They observe and record the shape of the moon and count the days between two full moons, a period called a *moon cycle*. A moon cycle is between 29 and 30 days.

Weather and observation.

Although it would be ideal to be able to see the moon each day during the moon watch, it is not necessary provided the students leave blank spaces on their record sheets when they cannot make observations. In fact this leads to the very important question, *Is the moon there when we cannot see it?* By finding the regularity in their observation the students will begin to hypothesize that unseen astronomical events occur even when they cannot observe them.

Season for the activity

This activity is a good spring activity when families can join in the nightly search for the moon. Part of the time the moon will be up during the daytime and can be viewed at school. Use school observations to fill in blanks left in home observations.

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When to start
Start at a full moon, which is unmistakable in the night sky. This is a flexible time since there are about three days when the moon appears to be full.

Alerting families
Before starting the moon watch, send word home to the students' families that a moon watch is about to begin and that their help will be needed. Be sure to explain what to do if the sky is too cloudy to see the moon and how to handle those nights when it is not convenient to make observations. It is exciting for many families to discover that much of the time the moon is up during the daytime, so don't mention this in your communications. See the sample letter in Fig. K.2.6.

Continuing count
It is suggested that the students continue to record moon information in the next cycle. This need not be at home. The moon watch investigation will be reinforced in Activity K.2.7 MOON PHASE where the students will look particularly for the sequence of the phases and compare the day counts between two new moons and two full moons.

STUDENT ROLES

Astronomer
Record keeper
Chronologist

MATERIALS

Learning Calendar
markers
crayons
letter to families
Student Page K.2.6 MOON WATCH

PRODUCTS

Completed Student Pages

PROCEDURES

1. **Find out what the students already know about the moon.**

   Ask such questions as these:
   - When did you last look at the moon?
   - What did it look like?
   - Does the moon always look the same?
   - Where did you see the moon?
   - What do you think a full moon looks like?

2. **Introduce the idea to the students of counting the days from one full moon to the next.**

   Help them do the following:
   - Make predictions about the number of days between full moons.
   - Record their individual predictions on Student Page K.2.6 MOON WATCH.

3. **Ask the families to help their children observe the moon each evening. Send a letter explaining the assignment. See Fig. K.2.6.**

   - Beginning with a full moon, have the students color a moon on the student page each day they observe one until the next full moon.

4. **If the moon is visible during the day, take the class outside to observe it.**

5. **Help the students record their moon data on the Learning Calendar.**

   Help them do the following things:
   - Draw a full moon to indicate they saw a full moon at the beginning of the moon watch.
   - Put a one (1) under the picture to show the *beginning* of the moon watch.
     ✔ See Activity K.2.2 BEGINNINGS.

- Draw the moon as it appears each day or night and count each day until they see the next full moon.
- Make a special mark to indicate the *ending* of the moon watch.
  ✔ See Activity K.2.3 ENDINGS.

6. **Discuss and summarize the results of the moon watch with the class.**

   Ask such questions as these:
   - How many days are there from full moon to full moon?
   - Was the moon always full? If not, what did the moon look like?
   - When it is cloudy or rainy, what do you think happens to the moon? Do you think the moon is still in the sky?
   - Have you ever seen the clouds cover and then uncover the moon? Is the moon still in the sky?
   - Have you ever seen the light of the moon behind the clouds? Is the moon still in the sky?
   - Did you ever see the moon during the day?
   - Have you ever seen the sun at night?
   - Do you think the number of days from full moon to full moon is always the same? How could we find out?
     ✔ Get at the idea that they can count again to the next full moon.

7. **Help the students reach the idea that they can repeat the moon watch to check their results. Encourage curiosity and record their questions in the Wonder and Discover Book.**

EXTENSIONS

- After several moon cycles, review the Learning Calendar and have the students count the days between full moons. Have the students compare the number of days in these different cycles. Expect answers between 27–32 days. Astronomically it is about 29 1/2 days.

SAMPLE LETTER

Dear Family;

Our kindergarten class is about to start a moon watch and we need your help. Over the next thirty days we will be observing the moon as it appears in the sky. So that the observations are comparable, we will start at the time of the next full moon, which will appear in the sky about__________
____ .

I have enclosed a copy of a sheet to keep track of the moon. Please help your child color the drawings.

There may be times when cloud cover will make observation impossible. Have your child invent a way to show times when no observation was made. Do not become concerned since the way we deal with missing data is one of the lessons of this moon watch. The moon will usually be visible in either the early evening or early morning.

We may need your help later for a second moon observation.

Thanks for your help. Please send the observation sheet back to school after the moon watch is completed. Enjoy this time of learning with your child.

Fig. K.2.6 Moon watch sample letter

DASH

MOON WATCH
SP K.2.6

Name ______________________

Date ______________________

Prediction	Observation
I think it will be _____ days until the next **full** moon	I counted _____ days from one **full** moon to the next.

full ○	○	○	○	○	○	○
○	○	○	○	○	○	○
○	○	○	○	○	○	○
○	○	○	○	○	○	○
○	○	○	○	○	○	○

DASH K.2.7 MOON PHASES

OBJECTIVES

The students
- compare time between two full moons with the time between two new moons
- observe, report, and record phases of the moon from new moon to new moon
- sequence moon phases
- identify the moon cycle as one of nature's clocks
- make a Moon Clock

BACKGROUND

MOON PHASES should follow Activities K.1.1 THE LEARNING CALENDAR, K.2.2 BEGINNINGS, K.2.3 ENDINGS, K.2.4 DAY AND NIGHT, K.2.5 DAYS, WEEKS, AND MONTHS, and K.2.6 MOON WATCH and should precede K.2.9 CLOCKS AND CALENDAR. In MOON PHASES the students again observe the phases of the moon starting with the new moon and then construct a Moon Clock. Families are once more asked to participate.

Connections with MOON WATCH

In the previous activity, K.2.6 MOON WATCH, the students counted the days between two *full* moons. Here they count the days and watch the phases between two *new* moons. The students find that the period of time between the new moons is about the same as the period between full moons. Special focus here is on the phases of the moon and their order. Observations are used help make a Moon Clock.

Moon phases

The moon phases follow in an ordered sequence. Starting with the new moon there are eight phases; the first crescent phase, the first quarter phase, the first gibbous phase, the new moon, the last or shrinking gibbous phase, the third quarter phase, the last crescent phase, and then back to the new moon. See Student Page K.2.7E MOON PHASES AND SHAPES. More formal study of moon phase will be carried out in *DASH 1*.

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When to use

MOON PHASES can be used anytime after Activity K.2.6 MOON WATCH; however, to get maximum reinforcement of ideas it is best done in the next moon cycle. If the students are already doing a second full-moon-to-full-moon day count as a continuation of K.2.6 MOON WATCH, continue it and concurrently begin the new study. Emphasize that this is a different count with different objectives. The students are now trying to find out whether the day counts between full moons and between new moons are the same or similar and the sequence of phases in the moon cycle.

STUDENT ROLES

Astronomer
Record keeper
Chronologist
Clock maker

MATERIALS

Learning Calendar
markers
crayons
glue
paper plates
brass fasteners
index cards
hole punch
chart paper
letter to families
Student Pages K.2.7 A NEW MOON
K.2.7 B-C SEQUENCE CARDS
K.2.7 D MOON CLOCK
K.2.7 E MOON PHASES

PRODUCTS

Class chart about moon phases
Moon Clocks (several will be needed in Activity K.2.9)
Completed Student Pages

PROCEDURES

1. **Review the results of Activity K.2.6 MOON WATCH with the students.**

   Ask such questions as these:
   - How many days did we find between two full moons?
     ✔ Introduce the idea that this is a *moon cycle* or changes in the moon that happen between full moons.
   - What did the moon look like during the moon cycle?
   - When is the best time to watch the moon?
   - Did you ever see the moon during the day?
   - What does a *new moon* look like?
   - What does a new baby look like compared to you or an adult?
     ✔ Get at size.
   - Was there a time when the moon was very small? What did it look like?
     ✔ Identify this as the time of the new moon.

2. **Discuss the questions, *Do you think the number the days from one new moon to the next new moon will be different from the count of days from full moon to full moon?* and *What are the moon's shapes or phases over this cycle?***

   Help the students do the following:
   - Predict the number of days from one new moon to the next. Record their predictions on Student Page K.2.7A NEW MOON.
   - Describe and discuss the various shapes (phases) the moon had in their last study.
   - Tell what they think the moon phases will look like when they study them again.

3. **Again ask the families to help their children observe the moon whenever possible. See the sample letter in Fig. K.2.6.**

- Send a note to families explaining the continuing assignment. Include Student Pages K.2.7A NEW MOON and K.2.7E MOON PHASES .

- Beginning with a new moon, have the students identify the moon phases, count the days until the next new moon, and record the phases in pictures.
  ✔ Use Student Page K.2.7A to record their observations.

4. **Have the students report and record their data on the Learning Calendar.**

   Help them
   - Draw the moon phases on the Learning Calendar.
     ✔ Ask, What was the shape of the moon?

   - Name the phases as specific shapes are identified by the students.
     ✔ See the Student Page K.2.7E MOON PHASES for names.
     ✔ The concepts of waxing and waning will be introduced in *DASH* 1.

   - Mark the starting *new moon* or the *beginning* of a cycle.

   - Draw the moon phase for each day they see the moon.

   - Mark the next *new moon* or the *ending* of the cycle.

   - Count the days between new moons.

   - Record the count on their calendar.

5. **Discuss the results of the moon watch with the class.**

   Ask such questions as these:
   - How many days are in a moon cycle starting with the new moon?

   - How many days are there from the new moon to the full moon?
     ✔ There will be about 14 (13–15).

   - How many days are there from the full moon to the new moon?
     ✔ There will be about 14 (13–15).

   - What are the moon phases in the order you saw them?

- How are the moon phases alike? How are they different?

- How many days were there in the cycle we observed from full moon to full moon?
  ✔ There were between 28 and 31 days, depending on the interpretation of "new moon." The astronomical time is about 29 1/2 days.

- How are the full-moon-to-full-moon and the new-moon-to-new- moon cycles alike?
  ✔ Their counts should be about the same.

- How are they different?
  ✔ Get at the idea that they have different starting points in the same cycle.

6. **Have the students work in groups to cut out the set of large moon phases from Student Pages K.2.7B and K.2.7C SEQUENCE CARDS and put them in order.**

   - Some students may arrange the cards in a linear sequence while others may form a circular sequence.

   - Have them share and explain their sequences.
     ✔ Encourage the students to make any modifications they wish.

7. **Help the students organize to make a moon clock. Have them cut out the set of small moon phase pictures from Student Page K.2.7D MOON CLOCK.**

   - Ask the students where they would place or draw the new and full moon cutouts on their paper plate.
     ✔ Note that the period between a new moon and a full moon is half a cycle, so they would place the new moon across from the full moon on the plate.

   - Help the students lay the rest of the moon phase cutouts in order on the clock face.
     ✔ Ask them where the quarter moons go, where the crescent moons go, and finally where the gibbous moons go.
     ✔ Use the sequence cards for reference.

8. **Help the students make the clock.**

   Help the students do the following:

- Make a clock by drawing or gluing their set of cutouts onto the plate.
- Cut index cards into strips to make pointers.
- Cut a point at one end of a strip and punch a hole in the opposite end with a punch or nail.
- Mark the centers of their paper plates and make holes through the center of the plate.
  ✔ You may want to punch the hole in the plate.
- Attach the pointer to the clock face with a brass fastener.

9. **Have the students test to see whether their clocks are accurate. Save several moon clocks for Activity K.2.9 CLOCKS AND CALENDARS.**

   Help them do the following:
   - Direct the pointer to the current moon phase.
   - Move the pointer to show the next phase. If their clocks are accurate, the pointer will move in the same order as the moon phases appear.
   - Re-do the clock if necessary to correspond to their observations.
   - Look at subsequent moon cycles as a way of validating their data.

EXTENSIONS

- Read Frank Asch's *Happy Birthday Moon.*
- Celebrate the moon's birthday. Point out that the new moon is the beginning of another cycle and another birthday. Have the students join in the planning.
- Have the students make a large class moon clock.

SAMPLE LETTER

Dear Family:

Our kindergarten class is again observing the moon. This time we will start with the new moon, which will appear in the sky about____________________.

Enclosed is another moon observation sheet. In addition to investigating the length of the moon cycle starting from different phase, this time we will be paying closer attention to the shape and sequence of the phases. Please help your child to make the drawings. We will also be giving names to the different phases. An information sheet is attached for your reference.

Again there may be times when cloud cover will make observation impossible. Have your child invent a way to show times when no observation was made. The moon will usually be visible in either the early evening or early morning.

Thanks for your help. Please send the observation sheet back to school after the moon watch is completed. Have fun observing with your child.

Fig. K.2.7 Moon Phase sample letter

DASH

NEW MOON
SP K.2.7A

Name ________________________

Date ________________________

Prediction	Observation
I think it will be _____ days until the next **new** moon	I counted _____ days from one **new** moon to the next.

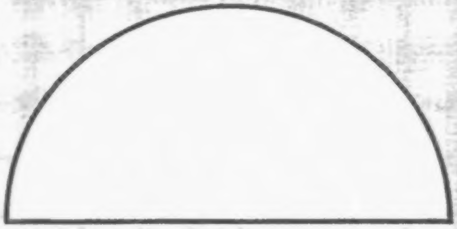
new ●	○	○	○	○	○	○
○	○	○	○	○	○	○
○	○	○	○	○	○	○
○	○	○	○	○	○	○
○	○	○	○	○	○	○

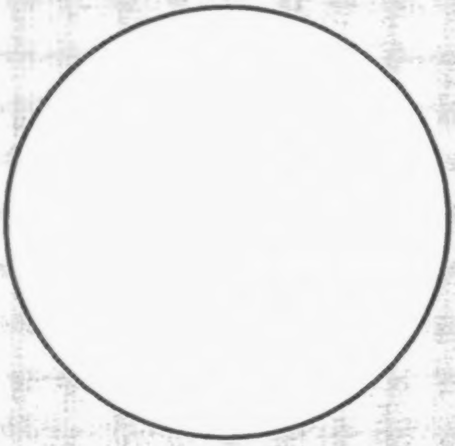
DASH

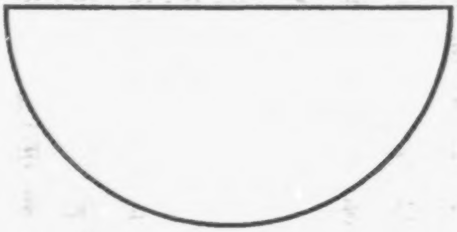
SEQUENCE CARDS
SP K.2.7B

Name ____________________

Date ____________________







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DASH

SEQUENCE CARDS SP K.2.7C

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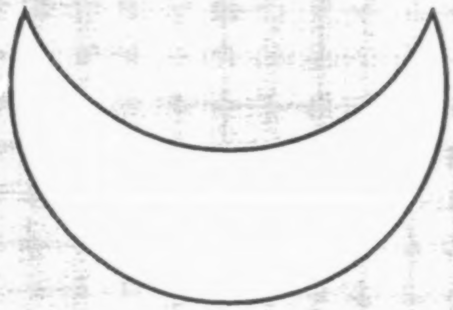
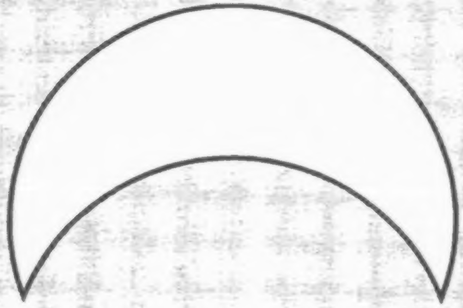
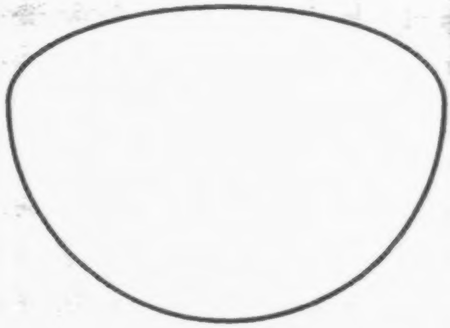
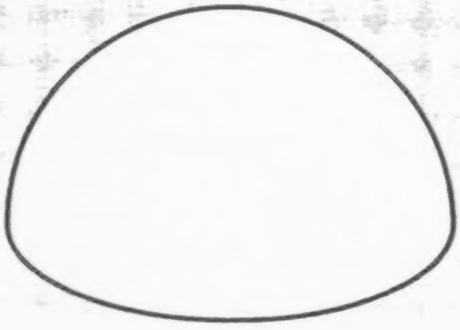
Date ______________________









DASH

MOON CLOCK
SP K.2.7D

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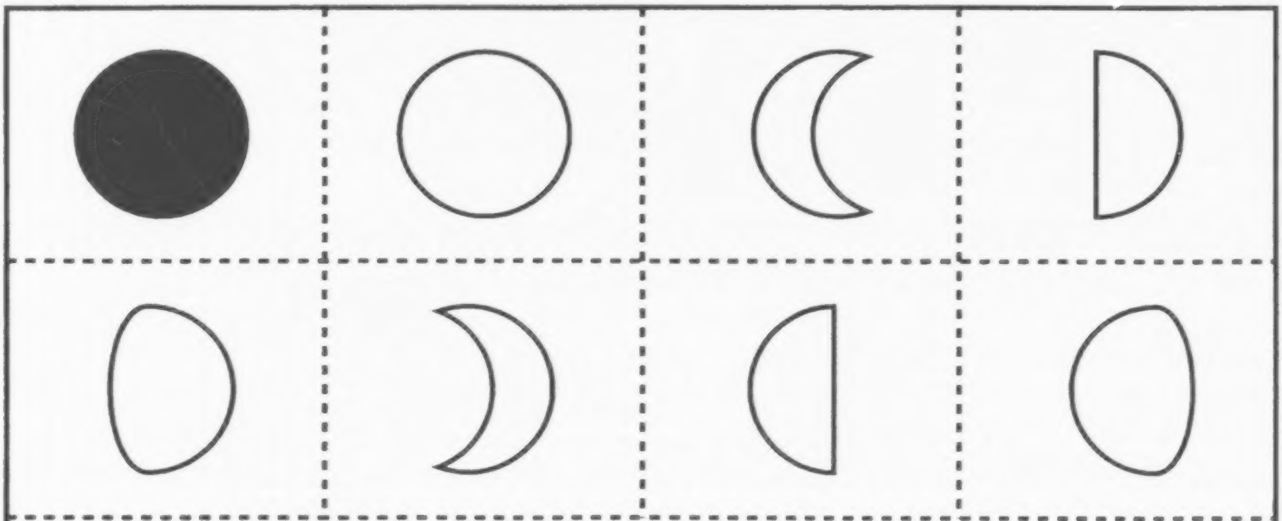
Date ______________________

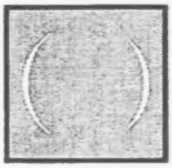


DASH

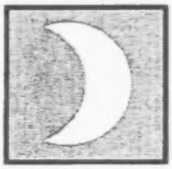
MOON PHASES
SP K.2.7E

Name ______________________

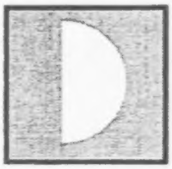
Date ______________________



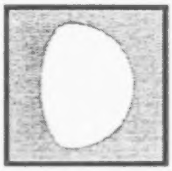
NEW: darkened or very dimly lit.



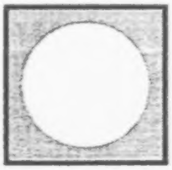
CRESCENT: smaller than half of the moon's face.



QUARTER: half of the moon's face is visible.



GIBBOUS: appears larger than a quarter moon yet is not full.



FULL: entire face of the moon is seen.

K.3.8 HOW BUGS WALK

OBJECTIVES

The students
- are introduced to external bug body parts and their functions
- compare insects, spiders, isopods, centipedes, and millipedes by their leg counts
- use simulations to help predict ways they will find that bugs can walk

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BACKGROUND

HOW BUGS WALK is one of four activities on external anatomy. It is followed by K.3.9 PARTS OF BUGS. Others activities in the series are K.3.10 PARTS OF MAMMALS and K.3.11 PEOPLE.

Predicting leg motion

This activity is designed to introduce the body structure of insects and their relatives. Using simulations, the students can make predictions about the ways bugs walk. In K.3.9 PARTS OF BUGS, these predictions will be tested. Through the simulation they will begin to get a sense of the segmented nature of bugs.

Bugs as a category

Bugs is a convenient, collective, and common name for the organisms introduced here. It represents the major division of the animal kingdom called Arthropoda, which includes the animals studied in the activity— insects, spiders, crustaceans, centipedes, and millipedes.

There is a technical problem in using the common name "bugs" because one of the orders or subdivisions of insects is "bugs." sometimes called "true bugs." This order includes the lace bug, stink bug, and the water boatman. This complication is not ignored in *DASH*; it is simply not fully explored in kindergarten. It is the intent of *DASH* to introduce both common and technical words because the students live with both common and technical names.

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Biology of the rhyme

Arthropods include six living classes. The most common five are referred to in the rhyme. See Fig. K.3.8. All arthropods have segmented bodies of more or less distinct parts. These parts are covered by an exoskeleton much like jointed pieces of armor. The exoskeleton is a tough, thin shell, and the muscles that move it are attached on the inside of the shell. This arrangement is quite different from our bodies where the skeleton is on the inside and the muscles are outside the skeleton.

The common five classes have different numbers of *walking legs,* and this feature is captured in the rhyme.

- *Insecta* or *insects* have 6 legs. They include beetles, butterflies, moths, and ants.
- *Arachnids* have 8 legs. They include spiders, horseshoe crabs, scorpions, and ticks.
- *Crustaceans* have 10 to 20 legs. They include crayfish, lobsters, barnacles, and isopods such as pill bugs (sow or roly-poly bugs).
- *Chilopods* or *centipedes* have 48–60 legs.
- *Diplods* or *millipedes* have 80–400 legs.

All these arthropods have mouth parts, some for crushing, some for sucking. All have eyes, and all but the spiders have antennas.

Use of the rhyme

Have fun with the rhyme. It provides the information base to support the simulation of bugs walking. By linking bodies, the students get a sense of the segmented nature of the bugs. Rhyme, rap, music, chant, and body motion all enhance memory.

STUDENT ROLES

Entomologist
Dancer

MATERIALS

chart paper
markers
sticks or cardboard tubes
We Are Bugs rhyme

PRODUCTS

Bug walks
Chart about the ways bugs walk

PROCEDURES

1. **Ask the students questions about their experiences with bugs.**

   Ask such questions as these:
   - Where have you found bugs?
   - What does a bug look like?
   - Are all bugs alike?

2 **Read the rhyme *We Are Bugs***

3. **Discuss the rhyme and have the students demonstrate the body parts.**

   Ask such questions as these:
   - What are bugs?
   - How might we tell an insect from a spider? From a crustacean? From a centipede? From a millipede?
   - What do insects have on their heads?
   - What might the antennas be used for?
   - Do you know of another kind of antenna?
   - How might a TV antenna be like the bug's antenna?
   - What might a bug use its eyes for?
   - What might a bug use its mouth for?
   - What kinds of sounds do bugs make?

- How do bugs get around from place to place?

4. **Read the rhyme again and explore the way insects might walk.**

    - Help student groups of three form an insect with six legs.
    - The first person uses his or her arms as antennas.
    - The second person wraps his or her arms around the waist of the first person and provides the second pair of legs.
    - The third person does the same for the third pair of legs.
    - Have the groups experiment in their insect groups with ways of walking.

- Have the groups demonstrate how insects might walk.

5. **Continue the exploration with the walking problems of other bugs.**

    - For spiders, add one person to the previous insect group.
      ✔ Spiders will not have antennas, a piece of information you will probably have to provide.
    - For a crustacean such as a crayfish, go to 5 students.
      ✔ Crayfish have antennas as do the rest of the arthropods.
    - For an isopod such as a pill bug (sow bug or roly-poly) with 14 legs, 7 students will be needed.
      ✔ Bring out the idea that we are adding segments to which the legs are attached.
    - For a centipede, use the whole class. Though "centipede" indicates something that has 100 legs, most centipedes have only 48–60 legs. Each additional person is another segment in the body,
    - For a millipede, have each student be one body segment with two pairs of legs. Arms can be extended to the floor with sticks or cardboard tubes to act as another pair of legs.

6. **Raise some further questions for investigation.**

   Ask such questions as these:
   - How do you think real insects, spiders, centipedes, and millipedes walk?

   - How could you find out?

7. **Make a two-column chart, one for predictions and one for observations about the way different kinds of bugs walk. Use such descriptions as *all move together*—all legs going forward and backward at the same time; *opposite sides move together*—legs on one side going forward while legs on the other go backward; *legs not moving together*. Proceed to Activity K.3.9 PARTS OF BUGS where bug walking is observed.**

EXTENSIONS

- Have the student simulate the walk of two- and four-legged animals
.

WE ARE BUGS

Refrain
We are bugs, bugs, walking up and down again.
Bugs, bugs, flying all around again.
Bugs, bugs, digging in the ground again.
Bugs, bugs, listen to our sound again.

Stanza
"Bugs" is the name we are commonly called,
A name that leaves entomologists galled.
Arthropods they claim
Is really our name,
So we'll learn both and they won't be appalled.
Refrain

Stanza
Our bodies are shells, segmented and firm,
Though some larvae are soft, just like a worm.
We have lots of legs,

And we all lay eggs,
And many of us live for a very short term.
Refrain

Stanza
We are known by the walking legs we inherit.
Insects have six, that's all that they merit.
Spiders have eight.
Now the number gets great
As a crustacean needs 10 to 20 to bear it.
Refrain

Stanza
Next comes the very fierce centipede.
Its name is most impressive indeed.
But it really does cheat,
And has not a hundred feet.
Only some 50 or 60 it really does need.
Refrain

Stanza
Now the leg count gets even bigger still,
For a thousand is the meaning of "mill."
And the long millipede
Walks quickly indeed
On 80 to 400 with coordinated skill.
Refrain

Stanza
Antennas can stick out of our head,
And our eyes may be white, green, or red.
Some mouths are like straws,
Some great crunching jaws,
Food odors we must sense in order to be fed.
Refrain

Stanza
There are very few things that we won't eat,
Be it vegetables, fruit, paper, or meat.
We clean up your mess,
Without us we'd guess
Decomposition would never be complete.
Refrain

Fig. K.3.8 Bug rhyme

K.3.9 PARTS OF BUGS

OBJECTIVES

The students
- identify external bug body parts and their functions
- observe how different kinds of bugs walk

BACKGROUND

PARTS OF BUGS is one of a series of activities on external anatomy. It should follow Activity K.3.8 HOW BUGS WALK and precede K.3.10 PARTS OF MAMMALS and K.3.11 PEOPLE.

The students pursue the question, *What are the external body parts of bugs?* To do this, they go into the field and observe bugs where they live. This is also a time to look further into how bugs walk.

Parts of bugs

The students were introduced to five different kinds of bugs or arthropods and some of their characteristics in Activity K.3.8 HOW BUGS WALK. In that activity, the students simulated the walking of insects, which have 6 legs; spiders, 8; crustaceans, 10–20, centipedes, 50-60; and millipedes, 80–400. They have felt the movement of segmented bodies made of jointed parts that allow arthropods to bend. They have heard that all bugs have eyes, and all but spiders, antennas.

Possible observations

Identification of body parts and other observations that may be made about various bugs are listed below:

- Insects have three big body divisions seen as separate bulges—the *head*, the *thorax*, and the *abdomen*, the same divisions we have in our body. The abdomen and thorax of insects consist of several segments. Six legs are attached to the thorax. Insects may also have wings.

- Spiders and their relatives have two big body divisions seen as separate bulges—the *cephlothorax*, a fused head and thorax, and an *abdomen*, and 8 legs. Scorpions are members of the same group as

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spiders and have eight legs and two pincers and a segmented abdomen with a poison tip.

- Crustaceans have two big body divisions seen as separate bulges—the *cephlothorax*, a fused head and thorax, and an *abdomen*. The abdomen is often divided into many segments, for example in the isopod called a pill bug. Leg counts can run from 10–20. Many water-dwelling members such as the crayfish and lobster have claws.

- Centipedes and their relatives have a *head* and a single pair of legs from each of 24–30 body segments with a total leg count of 48–60.

- Millipedes and their relatives have a *head* and two pairs of legs from each of 20 to 100 body segments with a total leg count of 80–400.

Do not expect the students to find all body parts at this time. Though most students will quickly pick up new words, this is not a vocabulary lesson, and they should concentrate on the nature of the structures rather than their particular names.

Handling and housing bugs
The students *should not* handle spiders, scorpions, centipedes, or millipedes. Until they can distinguish between different bugs, have them scooped into containers. To keep organisms from escaping from a container, cover the mouth with nylon hose or plastic wrap with holes to allow air to enter. For viewing, use a clear plastic cup.

Have the students mark where all bugs they collect are found with a flag on a skewer. Return the organisms to the environment as soon as possible.

Magnifying glasses
Have the students practice with their magnifiers before they go into the field. Have them explore
- how to focus the magnifier by moving it up and down
- how close they must get their eye to the magnifier
- how different magnifiers provide different amounts of magnification

Detailed study to insects
It is suggested that the detailed study of bugs can be limited to insects though study of other bugs is encouraged. Often there will not be enough specimens to allow study of other kinds of bugs.

Bug models
Models of insects and other bugs can be made using a wide variety of recycled materials, glue, and tape. Put materials into an Inventor's Box and appeal to the imagination of the students.

STUDENT ROLES

Entomologist
Zoologist
Biologist

MATERIALS

resealable bags
clear plastic cups
recycled nylon stockings
skewers
small fabric or yarn streamers.
plastic wrap
tape
glue
spoons
gloves
materials for bug models:
  Styrofoam
  clay or Play Dough
  straws
  egg cartons
  small boxes
  tubes
  other as requested or brought in by students
magnifying lenses
Student Pages K.3.9A INSECT
  K.3.9B BUGS

PRODUCTS

Completed class chart about ways bugs walk from Activity K.3.8 HOW BUGS WALK.
Bug models
Completed Student Pages

PROCEDURES

1. **Introduce the use of a magnifying glass or hand lens.**

   Have the students do the following:
   - Hold the magnifying glass close to object to be viewed.
   - Slowly move the magnifying glass up toward the eye until the object comes into focus.
   - Practice with various objects.
     ✔ A center where hidden things can be looked for in sand, soil, or fish gravel provides a good place to practice.

2. **Prepare for the field experience.**
   - Make marker flags and temporary cages.
   - Discuss field safety.
     ✔ How animals are to be observed and handled.
     ✔ What kinds of animals to tell you about.

3. **Return to the rhyme *We Are Bugs* from Activity K.3.8 HOW BUGS WALK and help the students recall how they can tell whether they have found insects, spiders, crustaceans, centipedes, or millipedes.**

4. **Have the students take hand lenses and go into the field and observe bugs.**

   Have them do the following:
   - Look for insects, spiders, crustaceans such as the isopods—sow bugs, centipedes, and millipedes.
   - Notice the kinds of places they are found.
   - Observe how each kind of bug walks.
   - Return to the classroom and tell what they have found.

5. **Have the students take containers with covers and flags and return to the field to collect insects and bring them into the classroom. Have them get as *large* an insect as possible.**

   Have the students do the following:
   - Scoop up insects carefully and gently.
     ✔ They can usually be scooped up with the containers.

- Cover the container for viewing.
- Put a flag where an insect is collected.

6. **Have the students observe their insects as you lead a discussion.**

Ask such questions as these:

- How do you know that you have an insect?
  ✔ Get at the number of legs.
  ✔ Use a magnifying glass as necessary.
- Can anyone show us the head of your insect?
- How do you know it is the head.
  ✔ Probe for the idea that this is where you find what look like eyes, and antennas.
- Can anyone show us where your chest is?
  ✔ Ask if anyone knows another name for chest, one that doctors sometimes use. If needed, give them the name *thorax* and write it on the board.
- Insects have a thorax, where might it be?
  ✔ Work to the idea of being below or right behind the head.
- Does anyone who has insects find a bulge in the back of the head or behind it? Can you show us?
  ✔ The thorax will be quite prominent on insects such ants and those that fly and less prominent on beetles.
- Does anyone know what doctors call your tummy or belly?
  ✔ Work to the idea of an *abdomen*. Write *abdomen* on the board.
  ✔ Point out that insects have a separate abdomen.

  Does anyone find a bulge in back of or behind the thorax? Can you show us?
  ✔ The abdomen will be quite prominent on insects such as ants and those that fly and less prominent on beetles.
- Where on our insect do the legs seem to be attached?
  ✔ This will be on the thorax. However, there will be a lot of movement and this may be difficult to see.

- Does anyone see anything else on your insect.
  ✔ Get at such things as wings, mouth parts, and antennas.

7. **Have them draw and label a picture of their insect on Student Page K.3.9A INSECT. Include labels for the head, thorax, abdomen, wings, antennas, eyes, and legs.**

8. **Have the students return their insects to the place they found them.**

   - When observations are complete, return the insects to where they were found.

   - Collect flags.

   - If there is time, other bugs can be investigated the same way.

9. **Have the students make three-dimensional models of a bug. Use recycled materials.**

   Help the students do the following:
   - Label the parts of their models.

   - Display and explain their models to the class.

10. **Summarize the activity using Student Page K.3.9B BUGS.**

    Ask such questions as these:
    - How many different body parts do different bugs have?

    - How did each kind of bug really walk?
      ✔ Probe to see whether their bugs walked as they predicted and fill out the observations of the chart about the ways bugs walk from Activity K.3.8 HOW BUGS WALK.
      ✔ You may want to do the bug walks again and modify movements.

EXTENSION

- Set up a center where students can use a magnifying glass center to observe insects and other bugs. Once created, it can be used anytime there are interesting things to see enlarged.

DASH

INSECT
SP K.3.9A

Name ______________________

Date ______________________

Draw your insect. Label the head, thorax, abdomen, leg, eye, wing, and antenna.

DASH

BUGS
SP K.3.9B

Name ____________________

Date ____________________

PICTURES	HOW MANY				
	LEGS	BODY PARTS	EYES	ANTENNAE	WINGS
INSECT					
SPIDER					
CRUSTACEAN					
CENTIPEDE					

K.4.4 GROWING BEAN SPROUTS

OBJECTIVES

The students
- investigate the structure of seeds
- discover the parts of plants into which different parts of the embryo will mature
- investigate a way to grow bean sprouts

BACKGROUND

GROWING BEAN SPROUTS is one of a series of activities on the study of plants. It is designed to be done concurrently with K.4.5 PLANTS AND WATER and K.5.1 BEAN SPROUT SALAD and before K.4.6 GARDENING. Other activities in the series are K.4.1 PLANT PARTS, K.4.2 PLANT ENVIRONMENTS, and K.4.3 PLANT USES.

In this activity the students first investigate the structure of a lima bean. This can be done any time before the study of sprouting. Then they follow the development of mung beans or other sprouting seeds for 5 days. At the end of the 5 days they eat the remaining sprouted seeds. See Activity K.5.1 BEAN SPROUT SALAD.

Lima bean anatomy

Soak lima beans overnight. Have the students examine a bean to find seed parts. Because lima beans are large, their parts are easily identified. See Fig. K.4.4. When the students examine their mung bean they will find that it has the same parts.

Concurrent studies

On Day 1 of this investigation 660–700 (about half a cup) of mung beans or other seeds are soaked overnight. Thirty or so dry seeds are saved for later dissection. On Day 2, two batches of seeds are wrapped in separate growing cloths. One batch contains 600 seeds; the other, 60–100 seeds. Starting on Day 3, the 60–100 seeds are not watered. The fate of these unwatered seeds is followed in Activity K.3.5 PLANTS AND WATER, which continues beyond GROWING BEAN SPROUTS through Day 8 or longer.

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The number of seeds is based on a class of 25 students, each using one germinating seed per day in each experiment and the remainder for the salad activity. There is usually 85% to 90% germination with fresh seed. Sprouting seed needs to be kept in a fairly warm environment of about 70° F for optimum growth.

The larger batch of 600–650 seeds is watered throughout this investigation with the final observation occurring on Day 5. On this same fifth day, Activity K.5.1 BEAN SPROUT SALAD is carried out using the remaining watered bean sprouts. GROWING BEAN SPROUTS can be extended several more days, but the eating quality of the sprouts will deteriorate over time.

Selection of seeds for sprouting
Mung beans are suggested for use in this experiment because they are commonly found in salads. A half cup of dried mung beans will normally be sufficient for all investigations. Because mung beans are small, the students will need hand lenses for their first observation. If mung beans are not available, try other types of small beans or radish seeds. Radishes will sprout well, but the seeds and sprouts are very small. Seeds for sprouting can usually be found in health food stores and some grocery stores.

When to start
The sprouting activity is designed to take 5 days. To complete the sprouting sequence, it should be started on a Monday and completed on a Friday.

Soaking beans
Soak the beans overnight in a jar of water to prepare them for sprouting. Do not leave them in the water for more than 24 hours or they will start to decompose. Rinse the beans before putting them on a growing cloth.

Growing cloth
A flour-sacking dish towel makes an excellent growing cloth for the larger quantity of sprouts. A smaller cloth can be used for the 60–100 seeds needed for Activity K.3.5 PLANTS AND WATER.

Keeping records
The students draw what they see each day and tape the bean- sprout parts that they observe to the student page.

Parts of seeds
Though this activity is not a study of nomenclature, students are usually curious about what things are called. For names of parts see Fig. K.4.4.

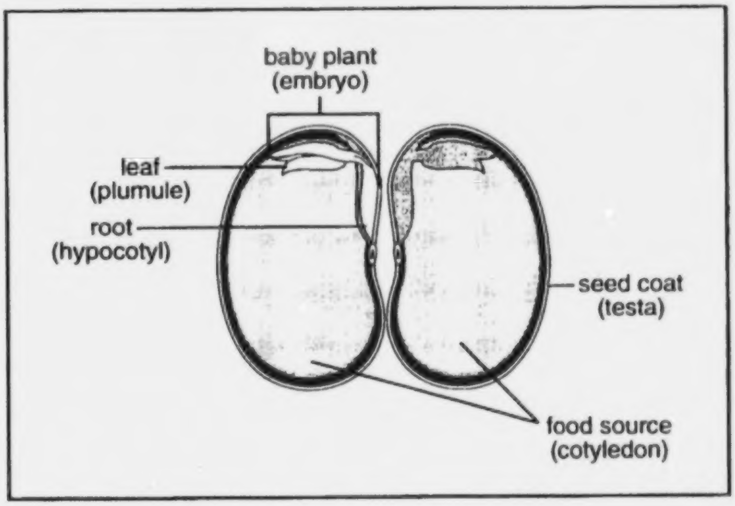
baby plant
(embryo)
leaf
(plumule)
root
(hypocotyl)
seed coat
(testa)
food source
(cotyledon)

Fig. K.4.4 Parts of a bean seed

Further growing of mung beans
It is very exciting to include mung beans as one of the food- producing plants to be grown in Activity K.4.6 GARDENING. At that time have the students predict what parts of the seed will come out of the ground. Keep all records on a chart about seed predictions.

STUDENT ROLES

Botanist
Farmer

MATERIALS

chart paper
lima beans
1/2 to 1 cup of mung beans or other seeds (small beans or radish seeds)
  for growing salad sprouts
2 flour-sacking dish towels
trays to hold cloths
quart jar
water source
tape
hand lenses
Student Pages K.4.4A LIMA BEAN
  K.4.4B BEAN SPROUTS

PRODUCTS

Class chart of seed predictions
Completed Student Pages

PROCEDURES

1. **Begin the study of plant development by having the students open a soaked lima bean and identify the parts. Have them use hand lenses to observe small structures.**

   Help the students do the following:

   - Review the use of hand lenses.
   - Observe the outside of a seed and draw it.
     ✔ They will normally find a seed coat or thin outside covering of the seed.
   - Open a seed with a fingernail or toothpick and use a magnifying glass to observe it.
     ✔ They will find the embryo with its miniature root and leaf structures.
     ✔ In addition they will find two large, whitish starch sources that give the seed its shape.
   - Make drawings of the parts of the seed.
     ✔ Have them use Student Page 4.4.4A LIMA BEAN.
   - Tape the parts of the soaked seeds to the Student Page
   - Name the seed parts and label the lima bean. See Fig. K.4.4.
     ✔ The skin-like covering is called the *testa.*
     ✔ They should be able to find the *embryo* or baby plant with its root or *hypocotyl* and the leaf structure or *plumule.*
     ✔ In addition they will find the *cotyledons*, the large whitish food sources that give the seed its shape.
   - Put the pages with the attached seed parts in a plant press.

2. **Introduce the idea of growing bean sprouts. Start the study by examining dry seeds.**

Help the students do the following:
- Examine unsoaked bean seeds using hand lenses.
  ✔ By pulling away the dry outer coat, they can see the two halves of the seed and open the seed.
- Look for parts that look like ones they saw in the lima bean.
- On Student Page K.4.4B BEAN SPROUTS draw pictures of what they see and label them.
- Tape the seeds to the student page.

3. **Day 1. Prepare the seeds. Have the students put 1/2 cup of mung bean seeds in a jar of water. Allow the beans to soak overnight. Stress hand washing since sprouts will be eaten.**

4. **Day 2. Have the students examine the soaked bean seeds and prepare seeds for sprouting. Stress hand washing.**

Help the students do the following:
- Observe the outside of a seed and draw it.
- Compare the parts of the soaked mung bean with the parts they previously found in the lima bean.
- Make a drawing of the parts of the mung bean seed and label the parts.
- Tape the parts of the soaked seeds to the Student Page K.4.4B BEAN SPROUTS.

5. **Make a large (about 600 or more seeds) and a small (about 60–100 seeds) bean-sprout seed-roll. The larger roll will be used in the rest of this sequence. Starting on Day 3 the smaller roll will be used with Activity K.4.5 PLANTS AND WATER. Once again stress hand washing.**

- Wet two sacking dish towels by soaking them and squeezing out excess water.
- For Activity K.4.5 PLANTS AND WATER spread 60 to 100 seeds evenly down the middle of a wet flour-sacking dish towel, leaving several inches around the outside.
  ✔ Fold over the edges to keep the seed from spilling out.
  ✔ Loosely roll the cloth up.

- Spread the remaining 600 or more seeds down the middle of the second wet flour-sacking dish towel leaving several inches around the outside.
  ✔ Fold over the edges to keep the seed from spilling out.
  ✔ Loosely roll the towel up.

- Dampen the towels thoroughly and when they stop dripping place them on a tray.
  ✔ This will be the only time the batch of seed in the smaller cloth will be dampened.
  ✔ The large dish towel should be soaked once each day.
  ✔ *Do not* put water in the tray. This will drown the seeds.

6. **Discuss what is known so far about bean seeds.**

Ask such questions as these:

- What is the color of the outside of the dry seed?
  ✔ It will be the same as the color of the coat of the soaked seed.

- Can anyone point to a seed coat on your student page? What is it like?
  ✔ Get at such things as it is a very thin shell, skin, or wrapping—this is the *testa.*

- What did you find on the inside of the seed?
  ✔ With a hand lens they probably saw the *cotyledons*, the *embryo* with its *plumule* and *hypocotyl.*

- What might each of the inside parts become? Record the class chart about seed predictions.

7. **Day 3. Unroll a little of the large towel and have each of the students remove a bean for study. Once again stress hand washing.**

Have each student do the following:

- Observe the seed and draw what they see from the outside on Student Page K.4.4B BEAN SPROUTS.

- Open their seeds carefully and use a hand lens to observe the parts.

- Tape the seed parts to the student page and label them.

- Continue to soak the towel once daily and after it stops dripping, put in back in its tray.

8. **Discuss changes in the seed.**

   Ask such questions as these:
   - What does the seed look like now?
   - What do you think is coming out of the seed?
   - What do you think will happen to the seeds in the small cloth if we don't water them?
     ✔ Record predictions on the chart about seed predictions.
     ✔ Do not open the small cloth at this time.

9. **Start Activity K.4.5 PLANTS AND WATER with the seeds in the smaller cloth. Allow the cloth to dry out.**

10. **Day 4. Unroll a little more of the large cloth and have each of the students remove another bean for study. Stress hand washing since sprouts will be eaten.**

    Have the students do the following:
    - Observe the seed and draw what they see from the outside on Student Page K.4.4 BEAN SPROUTS.
    - Open their seeds carefully and use a hand lens to observe the parts.
    - Tape the seed parts to the student page and label them.
    - Continue to soak the towel.

11. **Discuss changes in the seed.**

    Ask such questions as these:
    - What does the seed look like now?
    - What do you think is coming out of the seed?
      ✔ Record predictions on the chart about seed predictions.

12. **Day 5. Unroll a little more of the towel and have each of the students remove another bean for study. Stress hand washing since the sprouts will be eaten.**

    Have each student do the following:
    - Observe the bean seed and draw what they see on Student Page K.4.4 BEAN SPROUTS.

- Open their seeds, observe the parts, tape the seed parts to the student page, and label them.

13. **Ask the students questions about the seed right before it is eaten.**

    - What does the seed look like now?

    - Were your predictions about the seed parts correct?

14. **Proceed to Activity K.5.1 BEAN SPROUT SALAD.**

EXTENSION

- Germinate other seeds such as alfalfa, wheat, radish, corn, or others for comparison
  ✔ Caution: DO NOT EAT sprouted seeds unless they have come from a health-food store and are intended for sprouting. Seeds intended for field and garden planting are often dipped in chemicals to ward off mold and insects.

DASH

LIMA BEAN
SP K.4.4A

Name ____________________

Date ____________________

Draw the opened lima bean. Label the seed parts.

DASH

BEAN SPROUTS
SP K.4.4B

Name ____________________

Date ____________________

DAY	DATE	TAPE SEED	DRAW WHAT YOU SEE
1			
2			
3			
4			
5			

DASH

GRADE 1

ACTIVITY PLANS

Grade 1 DASH: Suggested Year 1 Activity Plan

CLUSTER	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MARCH	APRIL	MAY	JUNE
1. Learning	1.1.1-2 1.1.4	1.1.1-2 1.1.4	1.1.1-2	1.1.1-2	1.1.1-2	1.1.1-2 1.1.5 (1.1.8)	1.1.1-2	1.1.1-2	1.1.1-2	1.1.1-2	1.1.1-2 1.1.5 1.1.8
2. Time, Weather, & Sky	1.2.1-logos	1.2.1-wind, temp 1.2.10-Seasons	1.2.1-moon		1.2.10-Seasons	1.2.4-6-Time 1.2.7-8 Sunrs/st		1.2.10-Seasons	1.2.2-Rain	1.2.10-Seasons	
3. Animals		1.3.3-OSA 1.3.9-Pet		1.3.3-OSA			1.3.3-OSA		1.3.1-2-LivNLiv 1.3.6-8 Insects	1.3.3-OSA	
4. Plants		1.4.2-OSA		1.4.2-OSA			1.4.2-OSA	1.4.6 (1.4.1,3)		1.4.2-OSA	
5. Food and Nutrition				1.5.1-Food Grps 1.5.3-Vol							
6. Health and Safety	K.6.1		1.6.8-Safety				1.6.2-Teeth				1.6.1
7. Way-finding		1.7.2-NSEW								(1.7.5-6 Boat)	
8. Energy & Communication		1.8.1-Temp			1.8.4-Energy 1.8.1			1.8.1		1.8.1	
9. Conserv., Recycling, & Decompos.		1.9.1	1.9.4-5 Burial			1.9.1 (1.9.6)			1.9.1 (1.9.6)	1.9.5-DigUp	
10. Matter, Space, & Construction		1.10.2-OSA	1.10.1-MSCan	1.10.2-OSA			1.10.2-OSA 1.10.12-13 (House)	1.10.3-Water 1.10.6-Air		1.10.2-OSA	
NOTES	Learning Calendar Records	Weather		Food		Time	(House)	Plants	Animals	(Boats)	Wind Down

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Grade 1 DASH: Suggested Full Implementation Activity Plan											
CLUSTER	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MARCH	APRIL	MAY	JUNE
1. Learning	1.1.1-2	1.1.1-2 1.1.4 1.1.3-PlanCal	1.1.1-2	1.1.1-2	1.1.1-2	1.1.1-2 1.1.5-7 1.1.8	1.1.1-2	1.1.1-2	1.1.1-2	1.1.1-2	1.1.1-2 1.1.5 1.1.8
2. Time, Weather, & Sky	1.2.1	1.2.2-Rain 1.2.9-10-Seasons			1.2.9-10-Seasons	1.2.4-6,11-Time 1.2.7-8 Sunrs/st	1.2.3-Snow	1.2.9-10-Seasons	(1.2.2-Rain)	1.2.9-10-Seasons	
3. Animals	1.3.9-Pet	1.3.4 1.3.3-OSA		1.3.3-OSA			1.3.3-OSA		1.3.1-2-LivNLiv 1.3.5-8 Insects	1.3.3-OSA	
4. Plants		1.4.2,4-OSA (1.4.1,3)		1.4.2-OSA			1.4.2-OSA	1.4.5-6 PlantCyc (1.4.1,3)		1.4.2-OSA	
5. Food and Nutrition				1.5.1-3 Food&Vol							
6. Health and Safety	K.6.1, (2)		1.6.6-8-Safety			1.6.7	1.6.2-4 Teeth		1.6.5-Air		1.6.1, (2),7
7. Way-finding			1.7.1-4-Dist&Maps							1.7.5-9 Boats	
8. Energy & Communi-cation		1.8.1-Temp			1.8.1-Temp			1.8.1-Temp		1.8.1-3-Temp 1.8.4-Energy	
9. Conserv., Recycling, & Decompos.	1.9.1-Recyc	1.9.4-5 Burial			1.9.1,6-Recyc	1.9.2-3-Conserv		1.9.1,6-Recyc		1.9.5-DigUp	
10. Matter, Space, & Construction		1.10.2-OSA	1.10.1-MSCan	1.10.2-OSA		1.10.4-5 Plumbing	1.10.2-OSA 1.10.10-19 House		1.10.3,6-9 Water&Air	1.10.2-OSA	
NOTES	LearnCal Records Start Up	Weather OSA	Wayfinding Safety	Food		Time	House Dental	Plants	Animals Water&Air	Energy (Boats)	Finish Up Summary

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DASH Activities School Year Planning Form

CLUSTER	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MARCH	APRIL	MAY	JUNE
1. Learning											
2. Time, Weather, & Sky											
3. Animals											
4. Plants											
5. Food and Nutrition											
6. Health and Safety											
7. Way-finding											
8. Energy & Communication											
9. Conserv., Recycling, & Decompos.											
10. Matter, Space, & Construction											
NOTES and ORGANIZING IDEAS											

DASH

GRADE 1

SCOPE & SEQUENCE

ACTIVITY LISTS

GRADES K–5 DASH SCOPE AND SEQUENCE OF ACTIVITIES

CLUSTER	GRADE K	GRADE 1	GRADE 2	GRADE 3	GRADE 4	GRADE 5
Learning	Learning Calendar Home Learning Calendar Calendar Review Responsibility Chart Science Record Book Using Our Senses Same and Different Physical Characteristics Functions of Things Working Dictionary Wonder and Discover Book Connections Book Families Families and Helping Making Friends Being Friends School and Home Concept and Skill Inventory	Learning Calendar Responsibility Chart Planning Calendar Last Year Helping Working Together Taking Turns and Sharing Concept and Skill Inventory	Learning Calendar Last Year Aphorisms Helping Others Getting Help Making and Keeping Friends Turns School, Teacher, Friends, and Family Predictions about Tomorrow Planning for Tomorrow Thinking Library Concept and Skill Inventory	Learning Calendar Last Year Responsibility Planning Organizing Our Environment Friends Giving and Receiving Working Together Helping Myself and Others Aphorisms Next Year Science & Technology Concept and Skill Inventory	Learning Calendar Responsibility Last Year Library Working Together Things I Can Do for Myself and Others Aphorisms Planning Survival Game Concept and Skill Inventory	Learning Calendar Responsibility Library Working Together Things I Can Do for Myself and Others Aphorisms Friendship Concept and Skill Inventory
Time, Weather, and Sky	Weather Watch Beginnings Endings Day and Night Days, Weeks, and Months Moon Watch Moon Phases Seasons Clocks and Calendars	Sky and Weather Watch Rain and Streams Snow and Streams Digital Clock Hours and Minutes Time Line Sunrise and Sunset Night and Day The Sun The Seasons Making a Clock	Temperature Wind Sunrise, Sunset, and Seasons Moonrise and Moonset Rain Snow Digital Time Analog Time	Weather Temperature Wind Rain and Snow Humidity Sunrise and Sunset Moon Phases Polar Sky Model Polar Constellations Venus Eclipses	Rainfall and Snowfall Wind Direction & Speed Height of Clouds Clouds and Weather Storm Clouds Humidity and Wind Chill Lightning Weather Maps Weather Fronts Predicting Weather Flat or Round Earth? Length of Day and Night The Sun's Shadow Path The Planetarium Planets When Is It Noon? Making and Using a Sundial Seasons and the Sun Moon Phases and the Sun Eclipses	Weather Station Heat Index Weather Prediction Clouds and Fronts Triangles Gnomon Size of Earth Moon Through a Telescope How Big and Far Away Is the Moon? Paths of Celestial Bodies Models of the Solar System

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GRADES K–5 DASH SCOPE AND SEQUENCE OF ACTIVITIES

CLUSTER	GRADE K	GRADE 1	GRADE 2	GRADE 3	GRADE 4	GRADE 5
Animals	Appropriate Pets Classroom Animals Caring for Animals Living, Once-living, and Nonliving Things Animals and Plants Animal Environments Uses for Animals How Bugs Walk Parts of Bugs Parts of Mammals People Animals and Food Animals and Water Animals and Air Animal Wastes How Animals Keep Warm How Animals Keep Cool Real or Imaginary	Classroom Pets Living &and Nonliving Things Defining Living and Nonliving Things Animal Survey Animal Key Animal Needs Planning to Raise a Small Animal Building Cages Metamorphosis	Classroom Pets Classroom Aquarium External Anatomy of Fish Biological Needs of Fish Reproduction and Development of Fish Finding Insect Eggs Hatching Insect Eggs Early Metamorphosis Late Metamorphosis Collecting Spiders Insects and Spiders Spider Food Spider Care Spiders as Predators Spider Webs	Classroom Pets Raising Insects Comparing Insects Importance of Insects Frog and Toad Habitats Raising Frogs and Toads Frog Metamorphosis Importance of Frogs and Toads Toads and Insects Hatching Chicks Chick Growth Importance of Birds	Pet Care Unincubated Egg Chick Embryology Raising Small Mammals Reproduction of Pet Mammals Pet Baby Care Our Early Years The First Grade Child Development of Pets Human Development Changing Dimensions Anatomy of Fish Fish Reproduction Digestive, Circulatory, and Reproductive Systems Migration and Hibernation Fall, Winter, and Spring Birds	Pet Care Birds I Know Cells Male Urogenital System Female Urogenital System Ovulation Cycle Ovulation and Pregnancy Embryology Body Changes Bones Skeletal System Muscles Muscular System Chemistry and Bones The Senses The Eye Sound The Ear
Plants	Plant Parts Plant Environment Plant Uses Growing Bean Sprouts Plants and Water Gardening	Plant Identification Plant Survey Plant Pressing Plant Key Plant Needs Plant Life Cycle Edible Plant Parts Plant Parts Animals Eat	Soil Making Soil Soil and Plants Soil Uses Finding Soil Pipes and Water Moving Water: Gravity Moving Water: Pumps Vegetable and Flower Gardens in a Bucket Rooting Stems Rooting Bulbs and Tubers Roots and Water Growing Root Vegetables Tree Planting	Garden Planning Garden Preparation Watching Garden Soil Making Artificial Soil Testing Soil Soil and Water Garden Planting Garden Care Watering Systems Garden Invaders Controlling Insects Garden Harvesting Flowers Seeds Pollination	Annual, Biennial, and Perennial Plants Fungi	Annual, Biennial, and Perennial Plant Project Tree Harvesting Tree Planting Tree Observation Measuring Trees Age of Trees Trees, Shrubs, and Grasses Grasses: Why Do They Grow There? Roots Soil Conservation
Food and Nutrition	Bean Sprout Salad Drinks Flour and Bread Familiar Foods Favorite Foods New Foods	Food Groups Cooking Measuring Volume	Supermarket Survey Food Preference Food Groups New Foods Properties of Foods Changing Flavor Milk, Butter, and Cheese Energy from Food	Nutritious Food Selection Plants for the Garden Class Feast Drying and Pickling Foods Preserving and Rotting Supermarket Game Pricing Foods Food Ads	Nutrients Mechanical Digestion Chemical Digestion Food Groups Preserving Foods	Nutrients Nutrients and Cells Food Labeling

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GRADES K–5 DASH SCOPE AND SEQUENCE OF ACTIVITIES

CLUSTER	GRADE K	GRADE 1	GRADE 2	GRADE 3	GRADE 4	GRADE 5
Health and Safety	Growth Chart Tooth Chart Tooth Care Exercise Germs Washing Hands Bathrooms and Basins Aprons Fountains and Faucets Getting Sick Feeling Sick Going to the Doctor What Doctors Do Going to the Hospital Raincoats Testing Raincoats Wet and Cold Keeping Warm Indoors Hand and Foot Protection Getting Lost	Growth Chart Tooth Chart Brushing Teeth Chewing Air and Breathing Getting Hurt Staying Healthy Safety Rules	Growth Chart Tooth Chart Tooth Care Getting Hurt Getting Sick Staying Well Classroom and Playground Safety Fire Safety Using 911	Growth Chart Tooth Chart Breathing Air Anatomy of Breathing Lung Model Lungs and Smoking Breathing and Pulse Heart, Veins, and Arteries Heart, Lungs, and Exercise Disease Transmission Trash and Sanitation Helpful Drugs Proper Drug Use	Growth Chart and Area Measurement Tooth Chart Safety Gear Safety and Putting Out Fires Making a Fire Things That Burn Smoking and the Lungs Alcohol, Tobacco, and Drugs	Growth Chart and Area Measurement Tooth Chart Alcohol, Tobacco, and Drugs Sexually Transmitted Diseases Safety Devices Smokers' Surveys Smoking Laws Alcohol Laws Chris's Story The Parents' Story Intoxication Drug Laws
Wayfinding and Transportation	Right and Left Sunrise Sunset North and South Rising Moon Setting Moon Home Location Sidewalks & Walkways Roads Traffic Simulation Traffic Rules Mapping	Pacing North, South, East, and West Home Map Distance Making a Boat Making a Lake The Great Regatta Floating and Sinking Draining a Lake	Transportation Systems Making Race Cars Racing Cars Roads Building a Village Pedestrians in the Village Bikes in the Village Cars in the Village Bikes and Trikes Belts and Pulleys Fast and Slow Pulleys Gears and Wheels	Garden Mover Propeller-Driven Message Center Propeller-driven Boat Delivery Systems	Boat Design Wind and Sails	Where in the World Are We? Planetarium Mapping the Sky The North Pole, Equator, and Ecliptic Where Is Earth?

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GRADES K–5 DASH SCOPE AND SEQUENCE OF ACTIVITIES

CLUSTER	GRADE K	GRADE 1	GRADE 2	GRADE 3	GRADE 4	GRADE 5
Energy and Communication	Energy Making Things Move Making Things Stop Turning Things Off Turning Things On Repairing Things	Temperature of Things Master Thermometer Hot and Cold Sources of Energy	Sun and Direction Mirrors and Sunlight Clouds and Sunlight Comparing Temperatures Eclipses	Shadow, Light, and Bubbles Wind and Heat Wind Pulls and Pushes Propellers Driving Propellers Waterwheels Propellers in Water Heliograph Speaking Tube String Telephone Energy Definitions	Push-Pull Measuring Tool Friction Streamlining Pressure, Sharp Edges, and Points Energy of Falling Objects Circles and Speed	Pushes, Pulls, & Forces Teeter-Totters The Balance Wheels and Axles Levers Arms and Jaws Inclined Planes and Screws Block and Tackle Magnetic Pushes and Pulls Magnets and Compasses Magnetic Fields Forces Projects
Conservation, Recycling, and Decomposition	Decomposition Waste Disposal Recycling Project Making Paper	Classroom Resources Conserving Energy Conserving Water Decomposition and Unearthing Decomposition and Reburial Recycling	Fall Unearthing Fall Burying Spring Unearthing Spring Burying Pollution Survey Aluminum Recycling Connections	Making Compost Watching Compost Animals in Compost Using Compost Fall Unearthing and Burial Spring Unearthing and Burial	Unearthing and Burial Recycling Project	Class Recycling Project Class Conservation Project Decomposition and Archeology Pollution Project
Matter, Space, and Construction	Cubby Organization Patterns in Puzzles Making Puzzles Making Envelopes Making Boxes and Bags Volume of Boxes and Bags Packing and Storing Linear Measurement	Meter-string Can Outdoor Study Area Mapping Testing for Water Measuring Volume Plumbing Water Systems Air Bubbles in Water and Air Building with Air Floor Plan Cardboard House Plan Making a Cardboard House Painting the House Furnishing the House Sewing and Weaving Warming andCooling Lighting the House	Desk Organization Notebook Organization The Balance Meter-string Can Measuring Volume	Acidic and Basic Soil Acids and Bases Acid and Base Reactions Diluting Acids and Bases Acid and Base Interactions Dissolving Things Things in Liquids Crystals Rain in a Jar Supermarket Planning Supermarket Construction Measuring Devices Safety Equipment	Linear Measurement Volume Measurement Mass Measurement Collecting Rocks Hardness of Rocks Specific Gravity Rocks and Sharp Edges Making Tools from Rock Clowns: Things That Float Clay Fire and Pottery Air and Fire Fire and Oxygen Properties of Gas	Linear Measurement Volume Measurement Mass Measurement Camera Obscura Controlling Light with Lenses Making a Telescope Stabilizing the Telescope Making a Microscope Making a Hygrometer Making a Barometer

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DASH K
ACTIVITY LIST

CLUSTER 1 LEARNING

K.1.1 THE LEARNING CALENDAR
K.1.2 THE CLASS RESPONSIBILITY CHART
K.1.3 CALENDAR REVIEW
K.1.4 THE HOME LEARNING CALENDAR
K.1.5 THE SCIENCE RECORD BOOK
K.1.6 USING OUR SENSES
K.1.7 SAME AND DIFFERENT
K.1.8 PHYSICAL CHARACTERISTICS OF THINGS
K.1.9 FUNCTIONS OF THINGS
K.1.10 THE WORKING DICTIONARY AND WORKING DEFINITIONS
K.1.11 THE WONDER AND DISCOVER BOOK
K.1.12 THE CONNECTIONS BOOK
K.1.13 FAMILIES
K.1.14 FAMILIES AND HELPING
K.1.15 MAKING FRIENDS
K.1.16 BEING FRIENDS
K.1.17 SCHOOL AND HOME
K.1.18 CONCEPT AND SKILL INVENTORY

CLUSTER 2 TIME, WEATHER, AND SKY

K.2.1 WEATHER WATCH
K.2.2 BEGINNINGS
K.2.3 ENDINGS
K.2.4 DAY AND NIGHT
K.2.5 DAYS, WEEKS, AND MONTHS
K.2.6 MOON WATCH
K.2.7 MOON PHASES
K.2.8 SEASONS
K.2.9 CLOCKS AND CALENDARS

CLUSTER 3 ANIMALS

K.3.1 APPROPRIATE PETS
K.3.2 CLASSROOM ANIMALS
K.3.3 CARING FOR CLASSROOM ANIMALS
K.3.4 LIVING, ONCE-LIVING, AND NOT-LIVING
K.3.5 ANIMALS AND PLANTS
K.3.6 ANIMAL ENVIRONMENTS
K.3.7 USES FOR ANIMALS
K.3.8 HOW BUGS WALK
K.3.9 PARTS OF BUGS
K.3.10 PARTS OF MAMMALS
K.3.11 PEOPLE
K.3.12 ANIMALS AND FOOD
K.3.13 ANIMALS AND WATER
K.3.14 ANIMALS AND AIR
K.3.15 ANIMAL WASTES
K.3.16 HOW ANIMALS KEEP WARM
K.3.17 HOW ANIMALS KEEP COOL
K.3.18 REAL OR IMAGINARY

CLUSTER 4 PLANTS

K.4.1 PLANT PARTS
K.4.2 PLANT ENVIRONMENTS
K.4.3 PLANT USES
K.4.4 GROWING BEAN SPROUTS
K.4.5 PLANTS AND WATER
K.4.6 GARDENING

CLUSTER 5 FOOD AND NUTRITION

K.5.1 BEAN SPROUT SALAD
K.5.2 DRINKS
K.5.3 FLOUR AND BREAD
K.5.4 FAMILIAR FOODS
K.5.5 FAVORITE FOODS
K.5.6 NEW FOODS
K.5.7 SNACKS FROM THE GARDEN

CLUSTER 6 HEALTH AND SAFETY

K.6.1 GROWTH CHART
K.6.2 TOOTH CHART
K.6.3 TOOTH CARE
K.6.4 EXERCISE
K.6.5 GERMS
K.6.6 WASHING HANDS
K.6.7 BATHROOMS AND BASINS
K.6.8 APRONS
K.6.9 FOUNTAINS AND FAUCETS
K.6.10 GETTING SICK
K.6.11 FEELING SICK
K.6.12 GOING TO THE DOCTOR
K.6.13 WHAT DOCTORS DO
K.6.14 GOING TO THE HOSPITAL
K.6.15 RAINCOATS
K.6.16 TESTING RAINCOATS
K.6.17 WET AND COLD
K.6.18 KEEPING WARM INDOORS
K.6.19 KEEPING COOL INDOORS
K.6.20 HAND AND FOOT PROTECTION
K.6.21 GETTING LOST

CLUSTER 7 WAYFINDING AND TRANSPORTATION

K.7.1 RIGHT AND LEFT
K.7.2 SUNRISE
K.7.3 SUNSET
K.7.4 NORTH AND SOUTH
K.7.5 HOME LOCATION
K.7.6 SIDEWALKS AND WALKWAYS
K.7.7 ROADS
K.7.8 TRAFFIC SIMULATION EQUIPMENT
K.7.9 TRAFFIC SIMULATION MAPPING
K.7.10 TRAFFIC SIMULATION RULES
K.7.11 CLASSROOM MAPPING

CLUSTER 8 ENERGY AND COMMUNICATION

K.8.1 ENERGY
K.8.2 MAKING THINGS MOVE
K.8.3 MAKING THINGS STOP
K.8.4 TURNING THINGS OFF
K.8.5 TURNING THINGS ON
K.8.6 REPAIRING THINGS

CLUSTER 9 CONSERVATION, RECYCLING, AND DECOMPOSITION

K.9.1 DECOMPOSITION
K.9.2 WASTE DISPOSAL
K.9.3 RECYCLING PROJECT
K.9.4 MAKING PAPER

CLUSTER 10 MATTER, SPACE, AND CONSTRUCTION

K.10.1 CUBBY ORGANIZATION
K.10.2 PATTERNS IN PUZZLES
K.10.3 MAKING ENVELOPES
K.10.4 MAKING PUZZLES
K.10.5 MAKING BOXES AND BAGS
K.10.6 VOLUME OF BOXES AND BAGS
K.10.7 PACKING AND STORING
K.10.8 LINEAR MEASUREMENT

DASH 1
ACTIVITY LIST

CLUSTER 1 LEARNING

1.1.1 THE LEARNING CALENDAR
1.1.2 THE RESPONSIBILITY CHART
1.1.3 THE PLANNING CALENDAR
1.1.4 THING LEARNED LAST YEAR
1.1.5 HELPING
1.1.6 WORKING TOGETHER
1.1.7 TAKING TURNS AND SHARING
1.1.8 CONCEPT AND SKILL INVENTORY

CLUSTER 2 TIME, WEATHER, AND SKY

1.2.1 SKY AND WEATHER WATCH
1.2.2 RAIN AND STREAMS
1.2.3 SNOW AND STREAMS
1.2.4 THE DIGITAL CLOCK
1.2.5 HOURS AND MINUTES
1.2.6 TIME LINE
1.2.7 SUNRISE AND SUNSET
1.2.8 NIGHT AND DAY
1.2.9 THE SUN
1.2.10 THE SEASONS
1.2.11 MAKING A CLOCK
1.2.12 MOONRISE AND MOON SET

CLUSTER 3 ANIMALS

1.3.1 LIVING AND NON-LIVING THINGS
1.3.2 DEFINING LIVING AND NON-LIVING THINGS
1.3.3 ANIMAL SURVEY
1.3.4 ANIMAL KEY
1.3.5 ANIMAL NEEDS
1.3.6 PLANNING TO RAISE A SMALL ANIMAL
1.3.7 BUILDING CAGES
1.3.8 METAMORPHOSIS
1.3.9 CLASSROOM PETS

CLUSTER 4 PLANTS

1.4.1 PLANT IDENTIFICATION
1.4.2 PLANT SURVEY
1.4.3 PLANT PRESSING
1.4.4 PLANT KEY
1.4.5 PLANT NEEDS
1.4.6 PLANT LIFE CYCLE
1.4.7 EDIBLE PLANT PARTS
1.4.8 PLANT PARTS ANIMALS EAT

CLUSTER 5 FOOD AND NUTRITION

1.5.1 BASIC THREE FOOD GROUPS
1.5.2 COOKING
1.5.3 MEASURING VOLUME

CLUSTER 6 HEALTH AND SAFETY

1.6.1 GROWTH CHART
1.6.2 TOOTH CHART
1.6.3 BRUSHING TEETH
1.6.4 CHEWING
1.6.5 AIR AND BREATHING
1.6.6 GETTING HURT
1.6.7 STAYING HEALTHY
1.6.8 SAFETY RULES

CLUSTER 7 WAYFINDING AND TRANSPORTATION

1.7.1 PACING
1.7.2 NORTH, SOUTH, EAST, AND WEST
1.7.3 HOME
1.7.4 MAP DISTANCE
1.7.5 MAKING A BOAT
1.7.6 MAKING A LAKE
1.7.7 THE GREAT REGATTA
1.7.8 FLOATING AND SINKING
1.7.9 DRAINING A LAKE

CLUSTER 8 ENERGY AND COMMUNICATION

1.8.1 TEMPERATURE OF THINGS
1.8.2 THE MASTER THERMOMETER
1.8.3 HOT AND COLD
1.8.4 SOURCES OF ENERGY

CLUSTER 9 CONSERVATION, RECYCLING, AND DECOMPOSITION

1.9.1 CONSERVING CLASSROOM RESOURCES
1.9.2 CONSERVING ENERGY
1.9.3 CONSERVING WATER
1.9.4 DECOMPOSITION AND UNEARTHING
1.9.5 DECOMPOSITION AND REBURIAL
1.9.6 RECYCLING

CLUSTER 10 MATTER, SPACE, AND CONSTRUCTION

1.10.1 METER–STRING CAN
1.10.2 OUTDOOR STUDY AREA MAPPING
1.10.3 TESTING FOR WATER
1.10.4 PLUMBING
1.10.5 WATER SYSTEMS
1.10.6 AIR
1.10.7 BUBBLES IN WATER
1.10.8 BUBBLES IN AIR
1.10.9 BUILDING WITH AIR
1.10.10 FLOOR PLAN
1.10.11 FLOOR PLAN MODEL
1.10.12 CARDBOARD HOUSE PLAN
1.10.13 MAKING A CARDBOARD HOUSE
1.10.14 PAINTING THE HOUSE
1.10.15 FURNISHING THE HOUSE
1.10.16 SEWING
1.10.17 WEAVING
1.10.18 WARMING AND COOLING THE HOUSE
1.10.19 LIGHTING THE HOUSE
1.10.20 SAFETY EQUIPMENT

DASH 2
ACTIVITY LIST

CLUSTER 1 LEARNING

2.1.1 THE LEARNING CALENDAR
2.1.2 LAST YEAR
2.1.3 APHORISMS
2.1.4 HELPING MYSELF AND OTHERS
2.1.5 GETTING HELP
2.1.6 MAKING AND KEEPING FRIENDS
2.1.7 TURNS
2.1.8 SCHOOL, TEACHER, FRIENDS, AND FAMILY
2.1.9 PREDICTIONS ABOUT TOMORROW
2.1.10 PLANNING FOR TOMORROW
2.1.11 THINKING
2.1.12 LIBRARY
2.1.13 CONCEPT AND SKILL INVENTORY

CLUSTER 2 TIME, WEATHER, AND SKY

2.2.1 TEMPERATURE
2.2.2 WIND
2.2.3 SUNRISE, SUNSET, AND SEASONS
2.2.4 MOONRISE AND MOONSET
2.2.5 RAIN
2.2.6 SNOW
2.2.7 DIGITAL TIME
2.2.8 ANALOG TIME

CLUSTER 3 ANIMALS

2.3.1 THE CLASSROOM AQUARIUM
2.3.2 EXTERNAL ANATOMY OF FISH
2.3.3 BIOLOGICAL NEEDS OF FISH
2.3.4 REPRODUCTION AND DEVELOPMENT OF FISH
2.3.5 FINDING INSECT EGGS
2.3.6 HATCHING INSECT EGGS
2.3.7 EARLY METAMORPHOSIS
2.3.8 LATE METAMORPHOSIS
2.3.9 COLLECTING SPIDERS
2.3.10 SPIDER FOOD
2.3.11 SPIDER CARE
2.3.12 SPIDERS AS PREDATORS
2.3.13 SPIDER WEBS
2.3.14 CLASSROOM PETS

CLUSTER 4 PLANTS

2.4.1 SOIL
2.4.2 MAKING SOIL
2.4.3 SOIL AND PLANTS
2.4.4 SOIL USES
2.4.5 FINDING SOIL
2.4.6 PIPES AND WATER
2.4.7 MOVING WATER
2.4.8 MOVING WATER WITH PUMPS
2.4.9 VEGETABLE GARDEN IN A BUCKET
2.4.10 FLOWER GARDEN IN A BUCKET
2.4.11 PLANTS AND SUNLIGHT
2.4.12 ROOTING STEMS
2.4.13 ROOTING BULBS AND TUBERS
2.4.14 ROOTS AND WATER
2.4.15 GROWING ROOT VEGETABLES
2.4.16 TREE PLANTING

CLUSTER 5 FOOD AND NUTRITION

2.5.1 SUPERMARKET SURVEY
2.5.2 FOOD PREFERENCES
2.5.3 BASIC THREE FOOD GROUPS
2.5.4 NEW FOODS
2.5.5 IDENTIFYING PROPERTIES OF VEGETABLES
2.5.6 CHANGING FLAVOR
2.5.7 MILK
2.5.8 BUTTER
2.5.9 CHEESE
2.5.10 ENERGY FROM FOOD

CLUSTER 6 HEALTH AND SAFETY

2.6.1 GROWTH CHART
2.6.2 TOOTH CHART
2.6.3 TOOTH CARE
2.6.4 GETTING HURT
2.6.5 GETTING SICK
2.6.6 STAYING WELL
2.6.7 CLASSROOM AND PLAYGROUND SAFETY
2.6.8 FIRE SAFETY
2.6.9 USING 911

CLUSTER 7 WAYFINDING AND TRANSPORTATION

2.7.1 TRANSPORTATION SYSTEMS
2.7.2 MAKING RACE CARS
2.7.3 RACING AND MODIFYING CARS
2.7.4 ROADS
2.7.5 BUILDING A VILLAGE
2.7.6 PEDESTRIANS IN THE VILLAGE
2.7.7 BIKES IN THE VILLAGE
2.7.8 CARS IN THE VILLAGE
2.7.9 BIKES AND TRIKES
2.7.10 BELTS AND PULLEYS
2.7.11 FAST AND SLOW PULLEYS
2.7.12 GEARS AND WHEELS

CLUSTER 8 ENERGY AND COMMUNICATION

2.8.1 CAMERA OBSCURA
2.8.2 MIRRORS AND SUNLIGHT
2.8.3 CLOUDS AND SUNLIGHT
2.8.4 COMPARING TEMPERATURES
2.8.5 ECLIPSES

CLUSTER 9 CONSERVATION, RECYCLING, AND DECOMPOSITION

2.9.1 FALL UNEARTHING
2.9.2 FALL BURYING
2.9.3 SPRING UNEARTHING
2.9.4 SPRING BURYING
2.9.5 POLLUTION SURVEY AND CLEANUP
2.9.6 ALUMINUM RECYCLING
2.9.7 CONNECTIONS

CLUSTER 10 MATTER, SPACE, AND CONSTRUCTION

2.10.1 DESK ORGANIZATION
2.10.2 NOTEBOOK ORGANIZATION
2.10.3 THE BALANCE
2.10.4 METER-STRING CAN
2.10.5 MEASURING VOLUME
2.10.6 SAFETY EQUIPMENT

DASH 3
ACTIVITY LIST

CLUSTER 1 LEARNING

3.1.1 THE LEARNING CALENDAR
3.1.2 LAST YEAR
3.1.3 RESPONSIBILITY
3.1.4 PLANNING
3.1.5 ORGANIZING OUR ENVIRONMENT
3.1.6 FRIENDS
3.1.7 GIVING AND RECEIVING
3.1.8 WORKING TOGETHER
3.1.9 HELPING MYSELF AND OTHERS
3.1.10 APHORISMS
3.1.11 NEXT YEAR
3.1.12 CAREY'S GARDEN
3.1.13 CONCEPT AND SKILL INVENTORY

CLUSTER 2 TIME, WEATHER, AND SKY

3.2.1 WEATHER
3.2.2 TEMPERATURE
3.2.4 WIND
3.2.5 RAIN AND SNOW
3.2.6 HUMIDITY
3.2.7 MOON PHASES
3.2.8 POLAR SKY MODEL
3.2.9 POLAR CONSTELLATIONS
3.2.10 VENUS
3.2.11 ECLIPSES

CLUSTER 3 ANIMALS

3.3.1 CLASSROOM PETS
3.3.2 PREPARING TO RAISE INSECTS
3.3.3 RAISING INSECTS
3.3.4 IMPORTANCE OF INSECTS
3.3.5 NATURAL HABITATS OF FROGS AND TOADS
3.3.6 MAKING HABITATS FOR FROGS AND TOADS
3.3.7 FROG METAMORPHOSIS
3.3.8 IMPORTANCE OF FROGS AND TOADS
3.3.9 TOADS AND INSECTS
3.3.10 HATCHING CHICKS
3.3.11 CHICK GROWTH
3.3.12 IMPORTANCE OF BIRDS

CLUSTER 4 PLANTS

3.4.1 GARDEN PLANNING
3.4.2 GARDEN PREPARATION
3.4.3 WATCHING GARDEN SOIL
3.4.4 MAKING ARTIFICIAL SOIL
3.4.5 TESTING ARTIFICIAL SOIL
3.4.6 SOIL AND WATER
3.4.7 GARDEN PLANTING
3.4.8 GARDEN CARE
3.4.9 GARDEN WATERING SYSTEMS
3.4.10 GARDEN INVADERS
3.4.11 CONTROLLING INSECTS
3.4.12 GARDEN HARVESTING
3.4.13 FLOWERS
3.4.14 SEEDS
3.4.15 POLLINATION

CLUSTER 5 FOOD AND NUTRITION

3.5.1 FOOD SELECTION
3.5.2 SELECTING PLANTS FOR THE GARDEN
3.5.3 PLANNING THE CLASS FEAST
3.5.4 PREPARING THE CLASS FEAST
3.5.5 THE CLASS FEAST
3.5.6 DRYING FOODS
3.5.7 PICKLING FOODS
3.5.8 PRESERVING AND ROTTING
3.5.9 SUPERMARKET GAME PREPARATION
3.5.10 PRICING FOODS
3.5.11 NEWSPAPER ADS AND BANKING
3.5.12 FARMERS AND PROCESSORS
3.5.13 SUPERMARKET GAME

CLUSTER 6 HEALTH AND SAFETY

3.6.1 GROWTH CHART
3.6.2 TOOTH CHART
3.6.3 BREATHING AIR
3.6.4 ANATOMY OF BREATHING
3.6.5 LUNG MODEL
3.6.6 LUNGS AND SMOKING
3.6.7 BREATHING AND PULSE RATES
3.6.8 HEART, VEINS, AND ARTERIES
3.6.9 HEART, LUNGS, AND EXERCISE
3.6.10 DISEASE TRANSMISSION
3.6.11 TRASH AND SANITATION
3.6.12 HELPFUL DRUGS
3.6.13 PROPER DRUG USE

CLUSTER 7 WAYFINDING AND TRANSPORTATION

3.7.1 GARDEN MOVER
3.7.2 PROPELLER-DRIVEN MESSAGE CENTER
3.7.3 PROPELLER-DRIVEN BOAT
3.7.4 DELIVERY SYSTEMS

CLUSTER 8 ENERGY AND COMMUNICATION

3.8.1 SHADOW, LIGHT, AND BUBBLES
3.8.2 WIND AND HEAT
3.8.3 WIND PULLS AND PUSHES
3.8.4 PROPELLERS DRIVING PROPELLERS
3.8.5 WATERWHEELS
3.8.6 PROPELLERS IN WATER
3.8.7 HELIOGRAPH
3.8.8 SPEAKING TUBE
3.8.9 STRING TELEPHONE
3.8.10 ENERGY DEFINTIONS

CLUSTER 9 CONSERVATION, RECYCLING, AND DECOMPOSITION

3.9.1 MAKING COMPOST
3.9.2 WATCHING COMPOST
3.9.3 ANIMALS IN COMPOST
3.9.4 USING COMPOST
3.9.5 FALL UNEARTHING AND BURIAL
3.9.6 SPRING UNEARTHING AND BURIAL

CLUSTER 10 MATTER, SPACE, AND CONSTRUCTION

3.10.1 ACIDIC AND BASIC SOIL
3.10.2 ACIDS AND BASES
3.10.3 ACID AND BASE REACTIONS
3.10.4 DILUTING ACIDS AND BASES
3.10.5 ACID AND BASE INTERACTION
3.10.6 DISSOLVING THINGS
3.10.7 THINGS IN LIQUIDS
3.10.8 CRYSTALS
3.10.9 RAIN IN A JAR
3.10.10 SUPERMARKET PLANNING
3.10.11 SUPERMARKET CONSTRUCTION
3.10.12 MEASURING DEVICES
3.10.13 SAFETY EQUIPMENT

DASH 4
ACTIVITY LIST

CLUSTER 1 LEARNING

4.1.1 THE LEARNING CALENDAR
4.1.2 RESPONSIBILITY
4.1.3 LAST YEAR
4.1.4 THE LIBRARY
4.1.5 WORKING TOGETHER
4.1.6 THINGS I CAN DO FOR MYSELF AND FOR OTHERS
4.1.7 APHORISMS
4.1.8 PLANNING
4.1.9 SURVIVAL GAME
4.1.10 CONCEPT AND SKILL INVENTORY

CLUSTER 2 TIME, WEATHER, AND SKY

4.2.1 RAINFALL
4.2.2 SNOWFALL
4.2.3 WIND DIRECTION
4.2.4 WIND SPEED
4.2.5 HEIGHT OF CLOUDS
4.2.6 HUMIDITY
4.2.7 CLOUDS AND WEATHER
4.2.8 STORM CLOUDS
4.2.9 LIGHTNING
4.2.10 WEATHER MAPS
4.2.11 WEATHER FRONTS
4.2.12 PREDICTING WEATHER
4.2.13 WIND CHILL
4.2.14 FLAT OR ROUND EARTH
4.2.15 LENGTH OF DAY AND NIGHT
4.2.16 THE SUN'S SHADOW PATH
4.2.17 PLANETARIUM
4.2.18 USING THE PLANETARIUM
4.2.19 PLANETS
4.2.20 WHEN IS IT NOON?
4.2.21 MAKING A SUNDIAL
4.2.22 USING A SUNDIAL
4.2.23 SEASONS AND THE SUN
4.2.24 MOON PHASES AND THE SUN
4.2.25 ECLIPSES

CLUSTER 3 ANIMALS

4.3.1 PET CARE
4.3.2 THE UNINCUBATED EGG
4.3.3 CHICK EMBRYOLOGY
4.3.4 RAISING SMALL MAMMALS
4.3.5 HOUSING PET MAMMALS
4.3.6 WEEKEND CARE OF PET MAMMALS
4.3.7 PAIRING PET MAMMALS
4.3.8 REPRODUCTION OF PET MAMMALS
4.3.9 PET BABY CARE
4.3.10 OUR EARLY YEARS
4.3.11 THE FIRST GRADE CHILD
4.3.12 GROWTH, DEVELOPMENT, AND BEHAVIOR OF YOUNG PETS
4.3.13 HUMAN GROWTH AND DEVELOPMENT
4.3.14 CHANGING DIMENSIONS
4.3.15 EXTERNAL ANATOMY OF FISH
4.3.16 CLEANING FISH: INTERNAL ANATOMY
4.3.17 FISH REPRODUCTION
4.3.18 MODELING OUR DIGESTIVE SYSTEM
4.3.19 OUR DIGESTIVE SYSTEM IN TWO DIMENSIONS
4.3.20 DIGESTIVE, CIRCULATORY, AND RESPIRATORY SYSTEMS
4.3.21 LENGTH OF THE DIGESTIVE TRACT
4.3.22 MIGRATION AND HIBERNATION
4.3.23 FALL BIRDS
4.3.24 WINTER BIRDS
4.3.25 SPRING BIRDS

CLUSTER 4 PLANTS

4.4.1 ANNUAL, BIENNIAL, AND PERENNIAL GARDEN PLANTS
4.4.2 THE FUNGUS AMONG US
4.4.3 FUNGUS COLLECTION

CLUSTER 5 FOOD AND NUTRITION

4.5.1 NUTRITION MESSAGES
4.5.2 MECHANICAL DIGESTION
4.5.3 CHEMICAL DIGESTION
4.5.4 FOOD GROUPS
4.5.5 DIGESTION GAME
4.5.6 PRESERVING FOODS

CLUSTER 6 HEALTH AND SAFETY

4.6.1 GROWTH CHART AND AREA MEASUREMENT
4.6.2 TOOTH CHART
4.6.3 SAFETY GEAR
4.6.4 SAFETY AND PUTTING OUT FIRES
4.6.5 MAKING A FIRE
4.6.6 THINGS THAT BURN
4.6.7 SMOKING AND THE LUNGS
4.6.8 ALCOHOL, TOBACCO, AND DRUGS

CLUSTER 7 WAYFINDING AND TRANSPORTATION

4.7.1 BOAT DESIGN
4.7.2 WIND AND SAILS

CLUSTER 8 ENERGY AND COMMUNICATION

4.8.1 PUSH-PULL MEASURING TOOL
4.8.2 FRICTION
4.8.3 STREAMLINING
4.8.4 PRESSURE, SHARP EDGES, AND POINTS
4.8.5 ENERGY OF FALLING OBJECTS
4.8.6 CIRCLES AND SPEED

CLUSTER 9 CONSERVATION, RECYCLING, AND DECOMPOSITION

4.9.1 UNEARTHING
4.9.2 RECYCLING PROJECT

CLUSTER 10 MATTER, SPACE, AND CONSTRUCTION

4.10.1 LINEAR MEASUREMENT
4.10.2 VOLUME MEASUREMENT
4.10.3 MASS MEASUREMENT
4.10.4 COLLECTING ROCKS
4.10.5 HARDNESS OF ROCKS
4.10.6 SPECIFIC GRAVITY
4.10.7 ROCKS AND SHARP EDGES
4.10.8 MAKING TOOLS FROM ROCK
4.10.9 MAKING FISHING TOOLS
4.10.10 CLOWNS: THINGS THAT FLOAT
4.10.11 CLAY
4.10.12 FIRE AND POTTERY
4.10.13 AIR AND FIRE
4.10.14 FIRE AND OXYGEN
4.10.15 PROPERTIES OF GASES

DASH 5
ACTIVITY LIST

CLUSTER 1 LEARNING

5.1.1 THE LEARNING CALENDAR
5.1.2 RESPONSIBILITY
5.1.3 LIBRARY CHECK-OUT
5.1.4 LIBRARY CHECK-IN
5.1.5 WORKING TOGETHER
5.1.6 THINGS I CAN DO FOR MYSELF AND OTHERS
5.1.7 APHORISMS
5.1.8 FRIENDSHIP
5.1.9 CONCEPT AND SKILL INVENTORY

CLUSTER 2 TIME, WEATHER, AND SKY

5.2.1 WEATHER STATION
5.2.2 HEAT INDEX
5.2.3 WEATHER AND ITS PREDICTION
5.2.4 CLOUDS AND FRONTS
5.2.5 TRIANGLES
5.2.6 GNOMON
5.2.7 SIZE OF THE EARTH
5.2.8 MOON THROUGH A TELESCOPE
5.2.9 HOW BIG AND FAR AWAY IS THE MOON?
5.2.10 PATHS OF CELESTIAL BODIES
5.2.11 MODELS OF THE SOLAR SYSTEM

CLUSTER 3 ANIMALS

5.3.1 PET CARE
5.3.2 BIRD FEEDER
5.3.3 BIRDS I KNOW
5.3.4 CELLS
5.3.5 CELL QUIZ
5.3.6 MALE UROGENITAL SYSTEM
5.3.7 FEMALE UROGENITAL SYSTEM
5.3.8 OVULATION CYCLE
5.3.9 OVULATION AND PREGNANCY
5.3.10 EMBRYOLOGY
5.3.11 BODY CHANGES
5.3.12 BONES
5.3.13 SKELETAL SYSTEM
5.3.14 MUSCLES
5.3.15 MUSCULAR SYSTEM
5.3.16 CHEMISTRY AND BONES
5.3.17 THE SENSES
5.3.18 THE EYE
5.3.19 SOUND
5.3.20 THE EAR

CLUSTER 4 PLANTS

5.4.1 ANNUAL, BIENNIAL, AND PERENNIAL PLANT PROJECT
5.4.2 TREE HARVESTING
5.4.3 TREE PLANTING
5.4.4 TREE OBSERVATION
5.4.5 MEASURING TREES
5.4.6 AGE OF TREES
5.4.7 TREES, SHRUBS, AND GRASSES
5.4.8 GRASSES: WHY DO THEY GROW THERE?
5.4.9 ROOTS
5.4.10 SOIL CONSERVATION

CLUSTER 5 FOOD AND NUTRITION

5.5.1 NUTRIENTS
5.5.2 NUTRIENTS AND CELLS
5.5.3 FOOD LABELING

CLUSTER 6 HEALTH AND SAFETY

5.6.1 GROWTH CHART AND AREA MEASUREMENT
5.6.2 TOOTH CHART
5.6.3 SAFETY DEVICES
5.6.4 ALCOHOL, TOBACCO, AND DRUGS
5.6.5 SEXUALLY TRANSMITTED DISEASES
5.6.6 SEXUALLY TRANSMITTED DISEASE QUIZ
5.6.7 TOBACCO QUIZ
5.6.8 SMOKERS' SURVEY
5.6.9 EX-SMOKERS' SURVEY
5.6.10 SMOKING LAWS
5.6.11 ALCOHOL QUIZ
5.6.12 ALCOHOL LAWS
5.6.13 CHRIS'S STORY
5.6.14 THE PARENTS' STORY
5.6.15 INTOXICATION
5.6.16 DRUG LAWS

CLUSTER 7 WAYFINDING AND TRANSPORTATION

5.7.1 WHERE IN THE WORLD ARE WE?
5.7.2 PLANETARIUM
5.7.3 MAPPING THE SKY
5.7.4 THE NORTH POLE, EQUATOR, AND ECLIPTIC
5.7.5 WHERE IS EARTH?

CLUSTER 8 ENERGY AND COMMUNICATION

5.8.1 PUSHES, PULLS, AND FORCES
5.8.2 TEETER-TOTTERS
5.8.3 THE BALANCE
5.8.4 WHEELS AND AXLES
5.8.5 LEVERS: WHERE ARE THEY?
5.8.6 ARMS AND JAWS
5.8.7 INCLINED PLANES AND SCREWS
5.8.8 BLOCK AND TACKLE
5.8.9 FORCES PROJECTS

CLUSTER 9 CONSERVATION, RECYCLING, AND DECOMPOSITION

5.9.1 CLASS RECYCLING PROJECT
5.9.2 CLASS CONSERVATION PROJECT
5.9.3 DECOMPOSITION AND ARCHEOLOGY
5.9.4 POLLUTION PROJECT

CLUSTER 10 MATTER, SPACE, AND CONSTRUCTION

5.10.1 LINEAR MEASUREMENT
5.10.2 VOLUME MEASUREMENT
5.10.3 CAMERA OBSCURA
5.10.4 CONTROLLING LIGHT WITH LENSES
5.10.5 MAKING A TELESCOPE
5.10.6 STABILIZING THE TELESCOPE
5:10.7 MAKING A MICROSCOPE
5.10.8 MAKING A HYGROMETER
5.10.9 MAKING A BAROMETER

DASH 6
ACTIVITY LIST

CLUSTER 1 LEARNING

6.1.1 THE LEARNING CALENDAR
6.1.2 MARS MISSION
6.1.3 LAST YEAR
6.1.4 TOMORROW
6.1.5 THE WORK WORLD
6.1.6 GOALS
6.1.7 CRASH SIMULATION
6.1.8 MARS COMPACT
6.1.9 MARTIAN SIMULATION
6.1.10 THE MISSION CONFERENCE
6.1.11 CONCEPT AND SKILL INVENTORY

CLUSTER 2 TIME, WEATHER, AND SKY

6.2.1 WEATHER STATION
6.2.2 WEATHER AROUND THE UNITED STATES
6.2.3 WEATHER AND LOCAL CLIMATE
6.2.4 WIND HYPOTHESES
6.2.5 PRODUCING WINDS
6.2.6 AIR PRESSURE AND ALTITUDE
6.2.7 WIND AND WATER
6.2.8 ALTITUDE AND TEMPERATURE
6.2.9 MODELS OF AIR
6.2.10 CLIMATIC REGIONS
6.2.11 CLIMATE OF MARS

CLUSTER 3 ANIMALS

6.3.1 ANIMAL CARE
6.3.2 RAISING FISH
6.3.3 RAISING WORMS
6.3.4 FOOD CHAINS

CLUSTER 4 PLANTS

6.4.1 HYDROPONICS
6.4.2 ALGAE
6.4.3 NUTRIENTS AND BIOLOGICAL WASTE
6.4.4 WATER POLLUTANTS

CLUSTER 5 FOOD AND NUTRITION

6.5.1 NUTRIENT INFORMATION
6.5.2 THE KILOCALORIE
6.5.3 WEIGHT WATCHING
6.5.4 MEAL PLANNING
6.5.5 FOOD FOR SPACE
6.5.6 FISH FOR DINNER

CLUSTER 6 HEALTH AND SAFETY

6.6.1 GROWTH CHART
6.6.2 TOOTH CHART
6.6.3 SAFETY DEVICES
6.6.4 DISEASE LITERATURE
6.6.5 SANITATION
6.6.6 DISEASE-PRODUCING ORGANISMS
6.6.7 SEXUALLY TRANSMITTED DISEASES
6.6.8 DRUG ABUSE: PREVENTION AND TREATMENT
6.6.9 ALCOHOL AND TOBACCO
6.6.10 ENVIRONMENTAL DISEASE: TRANSMISSION, PREVENTION, AND TREATMENT
6.6.11 EXERCISE AND HEALTH AND THE MARS MISSION

CLUSTER 7 WAYFINDING AND TRANSPORTATION

6.7.1 FLYING AIRPLANES
FLYING ROCKETS
6.7.3 SPACECRAFT
6.7.4 THE ORBIT OF MARS
6.7.5 WHAT PATH TO MARS?

CLUSTER 8 ENERGY AND COMMUNICATION

6.8.1 ROCKET PROPULSION
6.8.2 MAGNETISM
6.8.3 ELECTROSTATICS
6.8.4 ELECTRICAL CIRCUITS
6.8.5 ROCK FORMATION
6.8.6 METALS FROM ROCK
6.8.7 ASYMMETRICAL LEVER

CLUSTER 9 CONSERVATION, RECYCLING, AND DECOMPOSITION

6.9.1 CLASS RECYCLING PROJECT
6.9.2 CONSERVATION
6.9.3 DECOMPOSITION: A SUMMARY
6.9.4 POLLUTION

CLUSTER 10 MATTER, SPACE, AND CONSTRUCTION

6.10.1 MAKING MEASURING EQUIPMENT
6.10.2 MAKING BALANCES
6.10.3 MAKING AN ELECTROSCOPE
6.10.4 MAKING ELECTROMAGNETS AND CURRENT INDICATORS
6.10.5 MAKING ELECTRIC CELLS
6.10.6 MAKING AN ELECTRIC MOTOR
6.10.7 MAKING AN ELECTRIC SIGNALER
6.10.8 MAKING A SURVIVAL HABITAT

DASH K–6
CLUSTER OUTLINES

CLUSTER ONE - LEARNING

GRADE KINDERGARTEN

K.1.1 THE LEARNING CALENDAR
K.1.2 THE CLASS RESPONSIBILITY CHART
K.1.3 CALENDAR REVIEW
K.1.4 THE HOME LEARNING CALENDAR
K.1.5 THE SCIENCE RECORD BOOK
K.1.6 USING OUR SENSES
K.1.7 SAME AND DIFFERENT
K.1.8 PHYSICAL CHARACTERISTICS OF THINGS
K.1.9 FUNCTIONS OF THINGS
K.1.10 THE WORKING DICTIONARY AND WORKING DEFINTIONS
K.1.11 THE WONDER AND DISCOVER BOOK
K.1.12 THE CONNECTIONS BOOK
K.1.13 FAMILIES
K.1.14 FAMILIES AND HELPING
K.1.15 MAKING FRIENDS
K.1.16 BEING FRIENDS
K.1.17 SCHOOL AND HOME
K.1.18 CONCEPT AND SKILL INVENTORY

GRADE ONE

1.1.1 THE LEARNING CALENDAR
1.1.2 THE RESPONSIBILITY CHART
1.1.3 THE PLANNING CALENDAR
1.1.4 THING LEARNED LAST YEAR
1.1.5 HELPING
1.1.6 WORKING TOGETHER
1.1.7 TAKING TURNS AND SHARING
1.1.8 CONCEPT AND SKILL INVENTORY

GRADE TWO

2.1.1 THE LEARNING CALENDAR
2.1.2 LAST YEAR
2.1.3 APHORISMS
2.1.4 HELPING MYSELF AND OTHERS
2.1.5 GETTING HELP
2.1.6 MAKING AND KEEPING FRIENDS
2.1.7 TURNS
2.1.8 SCHOOL, TEACHER, FRIENDS, AND FAMILY
2.1.9 PREDICTIONS ABOUT TOMORROW
2.1.10 PLANNING FOR TOMORROW
2.1.11 THINKING
2.1.12 LIBRARY
2.1.13 CONCEPT AND SKILL INVENTORY

GRADE THREE

3.1.1 THE LEARNING CALENDAR
3.1.2 LAST YEAR
3.1.3 RESPONSIBILITY
3.1.4 PLANNING
3.1.5 ORGANIZING OUR ENVIRONMENT
3.1.6 FRIENDS
3.1.7 GIVING AND RECEIVING
3.1.8 WORKING TOGETHER
3.1.9 HELPING MYSELF AND OTHERS
3.1.10 APHORISMS
3.1.11 NEXT YEAR
3.1.12 CAREY'S GARDEN
3.1.13 CONCEPT AND SKILL INVENTORY

GRADE FOUR

4.1.1 THE LEARNING CALENDAR
4.1.2 RESPONSIBILITY
4.1.3 LAST YEAR
4.1.4 THE LIBRARY
4.1.5 WORKING TOGETHER
4.1.6 THINGS I CAN DO FOR MYSELF AND FOR OTHERS
4.1.7 APHORISMS
4.1.8 PLANNING
4.1.9 SURVIVAL GAME
4.1.10 CONCEPT AND SKILL INVENTORY

GRADE FIVE

5.1.1 THE LEARNING CALENDAR
5.1.2 RESPONSIBILITY
5.1.3 LIBRARY CHECK-OUT
5.1.4 LIBRARY CHECK-IN
5.1.5 WORKING TOGETHER
5.1.6 THINGS I CAN DO FOR MYSELF AND OTHERS
5.1.7 APHORISMS
5.1.8 FRIENDSHIP
5.1.9 CONCEPT AND SKILL INVENTORY

GRADE SIX

6.1.1 THE LEARNING CALENDAR
6.1.2 MARS MISSION
6.1.3 LAST YEAR
6.1.4 TOMORROW
6.1.5 THE WORK WORLD
6.1.6 GOALS
6.1.7 CRASH SIMULATION
6.1.8 MARS COMPACT
6.1.9 MARTIAN SIMULATION
6.1.10 THE MISSION CONFERENCE
6.1.11 CONCEPT AND SKILL INVENTORY

BEST COPY AVAILABLE

CLUSTER TWO - TIME, WEATHER, AND SKY

GRADE KINDERGARTEN

K.2.1	WEATHER WATCH
K.2.2	BEGINNINGS
K.2.3	ENDINGS
K.2.4	DAY AND NIGHT
K.2.5	DAYS, WEEKS, AND MONTHS
K.2.6	MOON WATCH
K.2.7	MOON PHASES
K.2.8	SEASONS
K.2.9	CLOCKS AND CALENDARS

GRADE ONE

1.2.1	SKY AND WEATHER WATCH
1.2.2	RAIN AND STREAMS
1.2.3	SNOW AND STREAMS
1.2.4	THE DIGITAL CLOCK
1.2.5	HOURS AND MINUTES
1.2.6	TIME LINE
1.2.7	SUNRISE AND SUNSET
1.2.8	NIGHT AND DAY
1.2.9	THE SUN
1.2.10	THE SEASONS
1.2.11	MAKING A CLOCK
1.2.12	MOONRISE AND MOON SET

GRADE TWO

2.2.1	TEMPERATURE
2.2.2	WIND
2.2.3	SUNRISE, SUNSET, AND SEASONS
2.2.4	MOONRISE AND MOONSET
2.2.5	RAIN
2.2.6	SNOW
2.2.7	DIGITAL TIME
2.2.8	ANALOG TIME

GRADE THREE

3.2.1	WEATHER
3.2.2	TEMPERATURE
3.2.3	WIND
3.2.4	RAIN AND SNOW
3.2.5	HUMIDITY
3.2.6	SUNRISE AND SUNSET
3.2.7	MOON PHASES
3.2.8	POLAR SKY MODEL
3.2.9	POLAR CONSTELLATIONS
3.2.10	VENUS
3.2.11	ECLIPSES

GRADE FOUR

4.2.1	RAINFALL
4.2.2	SNOWFALL
4.2.3	WIND DIRECTION
4.2.4	WIND SPEED
4.2.5	HEIGHT OF CLOUDS
4.2.6	HUMIDITY
4.2.7	CLOUDS AND WEATHER
4.2.8	STORM CLOUDS
4.2.9	LIGHTNING
4.2.10	WEATHER MAPS
4.2.11	WEATHER FRONTS
4.2.12	PREDICTING WEATHER
4.2.13	WIND CHILL
4.2.14	FLAT OR ROUND EARTH
4.2.15	LENGTH OF DAY AND NIGHT
4.2.16	THE SUN'S SHADOW PATH
4.2.17	PLANETARIUM
4.2.18	USING THE PLANETARIUM
4.2.19	PLANETS
4.2.20	WHEN IS IT NOON?
4.2.21	MAKING A SUNDIAL
4.2.22	USING A SUNDIAL
4.2.23	SEASONS AND THE SUN
4.2.24	MOON PHASES AND THE SUN
4.2.25	ECLIPSES

GRADE FIVE

5.2.1	WEATHER STATION
5.2.2	HEAT INDEX
5.2.3	WEATHER AND ITS PREDICTION
5.2.4	CLOUDS AND FRONTS
5.2.5	TRIANGLES
5.2.6	GNOMON
5.2.7	SIZE OF EARTH
5.2.8	MOON THROUGH A TELESCOPE
5.2.9	HOW BIG AND FAR AWAY IS THE MOON?
5.2.10	PATHS OF CELESTIAL BODIES
5.2.11	MODELS OF THE SOLAR SYSTEM

GRADE SIX

6.2.1	WEATHER STATION
6.2.2	WEATHER AROUND THE UNITED STATES
6.2.3	WEATHER AND LOCAL CLIMATE
6.2.4	WIND HYPOTHESES
6.2.5	PRODUCING WINDS
6.2.6	AIR PRESSURE AND ALTITUDE
6.2.7	WIND AND WATER
6.2.8	ALTITUDE AND TEMPERATURE
6.2.9	MODELS OF AIR
6.2.10	CLIMATIC REGIONS
6.2.11	CLIMATE OF MARS

CLUSTER THREE - ANIMALS

GRADE KINDERGARTEN

K.3.1	APPROPRIATE PETS
K.3.2	CLASSROOM ANIMALS
K.3.3	CARING FOR CLASSROOM ANIMALS
K.3.4	LIVING, ONCE-LIVING, AND NOT-LIVING
K.3.5	ANIMALS AND PLANTS
K.3.6	ANIMAL ENVIRONMENTS
K.3.7	USES FOR ANIMALS
K.3.8	HOW BUGS WALK
K.3.9	PARTS OF BUGS
K.3.10	PARTS OF MAMMALS
K.3.11	PEOPLE
K.3.12	ANIMALS AND FOOD
K.3.13	ANIMALS AND WATER
K.3.14	ANIMALS AND AIR
K.3.15	ANIMAL WASTES
K.3.16	HOW ANIMALS KEEP WARM
K.3.17	HOW ANIMALS KEEP COOL
K.3.18	REAL OR IMAGINARY

GRADE ONE

1.3.1	LIVING AND NOT-LIVING THINGS
1.3.2	DEFINING LIVING AND NOT-LIVING THINGS
1.3.3	ANIMAL SURVEY
1.3.4	ANIMAL KEY
1.3.5	ANIMAL NEEDS
1.3.6	PLANNING TO RAISE A SMALL ANIMAL
1.3.7	BUILDING CAGES
1.3.8	METAMORPHOSIS
1.3.9	CLASSROOM PETS

GRADE TWO

2.3.1	THE CLASSROOM AQUARIUM
2.3.2	EXTERNAL ANATOMY OF FISH
2.3.3	BIOLOGICAL NEEDS OF FISH
2.3.4	REPRODUCTION AND DEVELOPMENT OF FISH
2.3.5	FINDING INSECT EGGS
2.3.6	HATCHING INSECT EGGS
2.3.7	EARLY METAMORPHOSIS
2.3.8	LATE METAMORPHOSIS
2.3.9	COLLECTING SPIDERS
2.3.10	SPIDER FOOD
2.3.11	SPIDER CARE
2.3.12	SPIDERS AS PREDATORS
2.3.13	SPIDER WEBS
2.3.14	CLASSROOM PETS

GRADE THREE

3.3.1	CLASSROOM PETS
3.3.2	PREPARING TO RAISE INSECTS
3.3.3	RAISING INSECTS
3.3.4	IMPORTANCE OF INSECTS
3.3.5	NATURAL HABITATS OF FROGS AND TOADS
3.3.6	MAKING HABITATS FOR FROGS AND TOADS
3.3.7	FROG METAMORPHOSIS
3.3.8	IMPORTANCE OF FROGS AND TOADS
3.3.9	TOADS AND INSECTS
3.3.10	HATCHING CHICKS
3.3.11	CHICK GROWTH
3.3.12	IMPORTANCE OF BIRDS

GRADE FOUR

4.3.1	PET CARE
4.3.2	THE UNINCUBATED EGG
4.3.3	CHICK EMBRYOLOGY
4.3.4	RAISING SMALL MAMMALS
4.3.5	HOUSING PET MAMMALS
4.3.6	WEEKEND CARE OF PET MAMMALS
4.3.7	PAIRING PET MAMMALS
4.3.8	REPRODUCTION OF PET MAMMALS
4.3.9	PET BABY CARE
4.3.10	OUR EARLY YEARS
4.3.11	THE FIRST GRADE CHILD
4.3.12	GROWTH, DEVELOPMENT, AND BEHAVIOR OF YOUNG PETS
4.3.13	HUMAN GROWTH AND DEVELOPMENT
4.3.14	CHANGING DIMENSIONS
4.3.15	EXTERNAL ANATOMY OF FISH
4.3.16	CLEANING FISH: INTERNAL ANATOMY
4.3.17	FISH REPRODUCTION
4.3.18	MODELING OUR DIGESTIVE SYSTEM
4.3.19	OUR DIGESTIVE SYSTEM IN TWO DIMENSIONS
4.3.20	DIGESTIVE, CIRCULATORY, AND RESPIRATORY SYSTEMS
4.3.21	LENGTH OF THE DIGESTIVE TRACT
4.3.22	MIGRATION AND HIBERNATION
4.3.23	FALL BIRDS
4.3.24	WINTER BIRDS
4.3.25	SPRING BIRDS

GRADE FIVE

5.3.1	PET CARE
5.3.2	BIRD FEEDER
5.3.3	BIRDS I KNOW
5.3.4	CELLS
5.3.5	CELL QUIZ
5.3.6	MALE UROGENITAL SYSTEM
5.3.7	FEMALE UROGENITAL SYSTEM
5.3.8	OVULATION CYCLE
5.3.9	OVULATION AND PREGNANCY
5.3.10	EMBRYOLOGY
5.3.11	BODY CHANGES
5.3.12	BONES
5.3.13	SKELETAL SYSTEM
5.3.14	MUSCLES
5.3.15	MUSCULAR SYSTEM
5.3.16	CHEMISTRY AND BONES
5.3.17	THE SENSES
5.3.18	THE EYE
5.3.19	SOUND
5.3.20	THE EAR

GRADE SIX

6.3.1	ANIMAL CARE
6.3.2	RAISING FISH
6.3.3	RAISING WORMS
6.3.4	FOOD CHAINS

CLUSTER FOUR - PLANTS

GRADE KINDERGARTEN

K.4.1	PLANT PARTS
K.4.2	PLANT ENVIRONMENTS
K.4.3	PLANT USES
K.4.4	GROWING BEAN SPROUTS
K.4.5	PLANTS AND WATER
K.4.6	GARDENING

GRADE ONE

1.4.1	PLANT IDENTIFICATION
1.4.2	PLANT SURVEY
1.4.3	PLANT PRESSING
1.4.4	PLANT KEY
1.4.5	PLANT NEEDS
1.4.6	PLANT LIFE CYCLE
1.4.7	EDIBLE PLANT PARTS
1.4.8	PLANT PARTS ANIMALS EAT

GRADE TWO

2.4.1	SOIL
2.4.2	MAKING SOIL
2.4.3	SOIL AND PLANTS
2.4.4	SOIL USES
2.4.5	FINDING SOIL
2.4.6	PIPES AND WATER
2.4.7	MOVING WATER
2.4.8	MOVING WATER WITH PUMPS
2.4.9	VEGETABLE GARDEN IN A BUCKET
2.4.10	FLOWER GARDEN IN A BUCKET
2.4.11	PLANTS AND SUNLIGHT
2.4.12	ROOTING STEMS
2.4.13	ROOTING BULBS AND TUBERS
2.4.14	ROOTS AND WATER
2.4.15	GROWING ROOT VEGETABLES
2.4.16	TREE PLANTING

GRADE THREE

3.4.1	GARDEN PLANNING
3.4.2	GARDEN PREPARATION
3.4.3	WATCHING GARDEN SOIL
3.4.4	MAKING ARTIFICIAL SOIL
3.4.5	TESTING ARTIFICIAL SOIL
3.4.6	SOIL AND WATER
3.4.7	GARDEN PLANTING
3.4.8	GARDEN CARE
3.4.9	GARDEN WATERING SYSTEMS
3.4.10	GARDEN INVADERS
3.4.11	CONTROLLING INSECTS
3.4.12	GARDEN HARVESTING
3.4.13	FLOWERS
3.4.14	SEEDS
3.4.15	POLLINATION

GRADE FOUR

4.4.1	ANNUAL, BIENNIAL, AND PERENNIAL GARDEN PLANTS
4.4.2	THE FUNGUS AMONG US
4.4.3	FUNGUS COLLECTION

GRADE FIVE

5.4.1	ANNUAL, BIENNIAL, AND PERENNIAL PLANT PROJECT
5.4.2	TREE HARVESTING
5.4.3	TREE PLANTING
5.4.4	TREE OBSERVATION
5.4.5	MEASURING TREES
5.4.6	AGE OF TREES
5.4.7	TREES, SHRUBS, AND GRASSES
5.4.8	GRASSES: WHY DO THEY GROW THERE?
5.4.9	ROOTS
5.4.10	SOIL CONSERVATION

GRADE SIX

6.4.1	HYDROPONICS
6.4.2	ALGAE
6.4.3	NUTRIENTS AND BIOLOGICAL WASTE
6.4.4	WATER POLLUTANTS

CLUSTER FIVE - FOOD AND NUTRITION

GRADE KINDERGARTEN

K.5.1	BEAN SPROUT SALAD
K.5.2	DRINKS
K.5.3	FLOUR AND BREAD
K.5.4	FAMILIAR FOODS
K.5.5	FAVORITE FOODS
K.5.6	NEW FOODS
K.5.7	SNACKS FROM THE GARDEN

GRADE ONE

1.5.1	BASIC THREE FOOD GROUPS
1.5.2	COOKING
1.5.3	MEASURING VOLUME

GRADE TWO

2.5.1	SUPERMARKET SURVEY
2.5.2	FOOD PREFERENCES
2.5.3	BASIC THREE FOOD GROUPS
2.5.4	NEW FOODS
2.5.5	IDENTIFYING PROPERTIES OF VEGETABLES
2.5.6	CHANGING FLAVOR
2.5.7	MILK
2.5.8	BUTTER
2.5.9	CHEESE
2.5.10	ENERGY FROM FOOD

GRADE THREE

3.5.1	FOOD SELECTION
3.5.2	SELECTING PLANTS FOR THE GARDEN
3.5.3	PLANNING THE CLASS FEAST
3.5.4	PREPARING THE CLASS FEAST
3.5.5	THE CLASS FEAST
3.5.6	DRYING FOODS
3.5.7	PICKLING FOODS
3.5.8	PRESERVING AND ROTTING
3.5.9	SUPERMARKET GAME PREPARATION
3.5.10	PRICING FOODS
3.5.11	NEWSPAPER ADS AND BANKING
3.5.12	FARMERS AND PROCESSORS
3.5.13	SUPERMARKET GAME

GRADE FOUR

4.5.1	NUTRITION MESSAGES
4.5.2	MECHANICAL DIGESTION
4.5.3	CHEMICAL DIGESTION
4.5.4	FOOD GROUPS
4.5.5	DIGESTION GAME
4.5.6	PRESERVING FOODS

GRADE FIVE

5.5.1	NUTRIENTS
5.5.2	NUTRIENTS AND CELLS
5.5.3	FOOD LABELING

GRADE SIX

6.5.1	NUTRIENT INFORMATION
6.5.2	THE KILOCALORIE
6.5.3	WEIGHT WATCHING
6.5.4	MEAL PLANNING
6.5.5	FOOD FOR SPACE
6.5.6	FISH FOR DINNER

CLUSTER SIX - HEALTH AND SAFETY

GRADE KINDERGARTEN

K.6.1 GROWTH CHART
K.6.2 TOOTH CHART
K.6.3 TOOTH CARE
K.6.4 EXERCISE
K.6.5 GERMS
K.6.6 WASHING HANDS
K.6.7 BATHROOMS AND BASINS
K.6.8 APRONS
K.6.9 FOUNTAINS AND FAUCETS
K.6.10 GETTING SICK
K.6.11 FEELING SICK
K.6.12 GOING TO THE DOCTOR
K.6.13 WHAT DOCTORS DO
K.6.14 GOING TO THE HOSPITAL
K.6.15 RAINCOATS
K.6.16 TESTING RAINCOATS
K.6.17 WET AND COLD
K.6.18 KEEPING WARM INDOORS
K.6.19 KEEPING COOL INDOORS
K.6.20 HAND AND FOOT PROTECTION
K.6.21 GETTING LOST

GRADE ONE

1.6.1 GROWTH CHART
1.6.2 TOOTH CHART
1.6.3 BRUSHING TEETH
1.6.4 CHEWING
1.6.5 AIR AND BREATHING
1.6.6 GETTING HURT
1.6.7 STAYING HEALTHY
1.6.8 SAFETY RULES

GRADE TWO

2.6.1 GROWTH CHART
2.6.2 TOOTH CHART
2.6.3 TOOTH CARE
2.6.4 GETTING HURT
2.6.5 GETTING SICK
2.6.6 STAYING WELL
2.6.7 CLASSROOM AND PLAYGROUND SAFETY
2.6.8 FIRE SAFETY
2.6.9 USING 911

GRADE THREE

3.6.1 GROWTH CHART
3.6.2 TOOTH CHART
3.6.3 BREATHING AIR
3.6.4 ANATOMY OF BREATHING
3.6.5 LUNG MODEL
3.6.6 LUNGS AND SMOKING
3.6.7 BREATHING AND PULSE RATES
3.6.8 HEART, VEINS, AND ARTERIES
3.6.9 HEART, LUNGS, AND EXERCISE
3.6.10 DISEASE TRANSMISSION
3.6.11 TRASH AND SANITATION
3.6.12 HELPFUL DRUGS
3.6.13 PROPER DRUG USE

GRADE FOUR

4.6.1 GROWTH CHART AND AREA MEASUREMENT
4.6.2 TOOTH CHART
4.6.3 SAFETY GEAR
4.6.4 SAFETY AND PUTTING OUT FIRES
4.6.5 MAKING A FIRE
4.6.6 THINGS THAT BURN
4.6.7 SMOKING AND THE LUNGS
4.6.8 ALCOHOL, TOBACCO, AND DRUGS

GRADE FIVE

5.6.1 GROWTH CHART AND AREA MEASUREMENT
5.6.2 TOOTH CHART
5.6.3 SAFETY DEVICES
5.6.4 ALCOHOL, TOBACCO, AND DRUGS
5.6.5 SEXUALLY TRANSMITTED DISEASES
5.6.6 SEXUALLY TRANSMITTED DISEASE QUIZ
5.6.7 TOBACCO QUIZ
5.6.8 SMOKERS' SURVEY
5.6.9 EX-SMOKERS' SURVEY
5.6.10 SMOKING LAWS
5.6.11 ALCOHOL QUIZ
5.6.12 ALCOHOL LAWS
5.6.13 CHRIS'S STORY
5.6.14 THE PARENTS' STORY
5.6.15 INTOXICATION
5.6.16 DRUG LAWS

GRADE SIX

6.6.1 GROWTH CHART
6.6.2 TOOTH CHART
6.6.3 SAFETY DEVICES
6.6.4 DISEASE LITERATURE
6.6.5 SANITATION
6.6.6 DISEASE-PRODUCING ORGANISMS
6.6.7 SEXUALLY TRANSMITTED DISEASES
6.6.8 DRUG ABUSE: PREVENTION AND TREATMENT
6.6.9 ALCOHOL AND TOBACCO
6.6.10 ENVIRONMENTAL DISEASE : TRANSMISSION, PREVENTION, AND TREATMENT
6.6.11 EXERCISE AND HEALTH AND THE MARS MISSION

CLUSTER SEVEN - WAYFINDING AND TRANSPORTATION

GRADE KINDERGARTEN

K.7.1	RIGHT AND LEFT
K.7.2	SUNRISE
K.7.3	SUNSET
K.7.4	NORTH AND SOUTH
K.7.5	HOME LOCATION
K.7.6	SIDEWALKS AND WALKWAYS
K.7.7	ROADS
K.7.8	TRAFFIC SIMULATION EQUIPMENT
K.7.9	TRAFFIC SIMULATION MAPPING
K.7.10	TRAFFIC SIMULATION RULES
K.7.11	CLASSROOM MAPPING

GRADE ONE

1.7.1	PACING
1.7.2	NORTH, SOUTH, EAST, AND WEST
1.7.3	HOME
1.7.4	MAP DISTANCE
1.7.5	MAKING A BOAT
1.7.6	MAKING A LAKE
1.7.7	THE GREAT REGATTA
1.7.8	FLOATING AND SINKING
1.7.9	DRAINING A LAKE

GRADE TWO

2.7.1	TRANSPORTATION SYSTEMS
2.7.2	MAKING RACE CARS
2.7.3	RACING AND MODIFYING CARS
2.7.4	ROADS
2.7.5	BUILDING A VILLAGE
2.7.6	PEDESTRIANS IN THE VILLAGE
2.7.7	BIKES IN THE VILLAGE
2.7.8	CARS IN THE VILLAGE
2.7.9	BIKES AND TRIKES
2.7.10	BELTS AND PULLEYS
2.7.11	FAST AND SLOW PULLEYS
2.7.12	GEARS AND WHEELS

GRADE THREE

3.7.1	GARDEN MOVER
3.7.2	PROPELLER-DRIVEN MESSAGE CENTER
3.7.3	PROPELLER-DRIVEN BOAT
3.7.4	DELIVERY SYSTEMS

GRADE FOUR

4.7.1	BOAT DESIGN
4.7.2	WIND AND SAILS

GRADE FIVE

5.7.1	WHERE IN THE WORLD ARE WE?
5.7.2	PLANETARIUM
5.7.3	MAPPING THE SKY
5.7.4	THE NORTH POLE, EQUATOR, AND ECLIPTIC
5.7.5	WHERE IS EARTH?

GRADE SIX

6.7.1	FLYING AIRPLANES
6.7.2	FLYING ROCKETS
6.7.3	SPACECRAFT
6.7.4	THE ORBIT OF MARS
6.7.5	WHAT PATH TO MARS?

CLUSTER EIGHT - ENERGY AND COMMUNICATION

GRADE KINDERGARTEN

K.8.1	ENERGY
K.8.2	MAKING THINGS MOVE
K.8.3	MAKING THINGS STOP
K.8.4	TURNING THINGS OFF
K.8.5	TURNING THINGS ON
K.8.6	REPAIRING THINGS

GRADE ONE

1.8.1	TEMPERATURE OF THINGS
1.8.2	THE MASTER THERMOMETER
1.8.3	HOT AND COLD
1.8.4	SOURCES OF ENERGY

GRADE TWO

2.8.1	CAMERA OBSCURA
2.8.2	MIRRORS AND SUNLIGHT
2.8.3	CLOUDS AND SUNLIGHT
2.8.4	COMPARING TEMPERATURES
2.8.5	ECLIPSES

GRADE THREE

3.8.1	SHADOW, LIGHT, AND BUBBLES
3.8.2	WIND AND HEAT
3.8.3	WIND PULLS AND PUSHES
3.8.4	PROPELLERS DRIVING PROPELLERS
3.8.5	WATERWHEELS
3.8.6	PROPELLERS IN WATER
3.8.7	HELIOGRAPH
3.8.8	SPEAKING TUBE
3.8.9	STRING TELEPHONE
3.8.10	ENERGY DEFINITIONS

GRADE FOUR

4.8.1	PUSH-PULL MEASURING TOOL
4.8.2	FRICTION
4.8.3	STREAMLINING
4.8.4	PRESSURE, SHARP EDGES, AND POINTS
4.8.5	ENERGY OF FALLING OBJECTS
4.8.6	CIRCLES AND SPEED

GRADE FIVE

5.8.1	PUSHES, PULLS, AND FORCES
5.8.2	TEETER-TOTTERS
5.8.3	THE BALANCE
5.8.4	WHEELS AND AXLES
5.8.5	LEVERS: WHERE ARE THEY?
5.8.6	ARMS AND JAWS
5.8.7	INCLINED PLANES AND SCREWS
5.8.8	BLOCK AND TACKLE
5.8.9	FORCES PROJECTS

GRADE SIX

6.8.1	ROCKET PROPULSION
6.8.2	MAGNETISM
6.8.3	ELECTROSTATICS
6.8.4	ELECTRICAL CIRCUITS
6.8.5	ROCK FORMATION
6.8.6	METALS FROM ROCK
6.8.7	ASYMMETRICAL LEVER

CLUSTER NINE - CONSERVATION, RECYCLING AND DECOMPOSITION

GRADE KINDERGARTEN

K.9.1 DECOMPOSITION
K.9.2 WASTE DISPOSAL
K.9.3 RECYCLING PROJECT
K.9.4 MAKING PAPER

GRADE ONE

1.9.1 CONSERVING CLASSROOM RESOURCES
1.9.2 CONSERVING ENERGY
1.9.3 CONSERVING WATER
1.9.4 DECOMPOSITION AND UNEARTHING
1.9.5 DECOMPOSITION AND REBURIAL
1.9.6 RECYCLING

GRADE TWO

2.9.1 FALL UNEARTHING
2.9.2 FALL BURYING
2.9.3 SPRING UNEARTHING
2.9.4 SPRING BURYING
2.9.5 POLLUTION SURVEY AND CLEANUP
2.9.6 ALUMINUM RECYCLING
2.9.7 CONNECTIONS

GRADE THREE

3.9.1 MAKING COMPOST
3.9.2 WATCHING COMPOST
3.9.3 ANIMALS IN COMPOST
3.9.4 USING COMPOST
3.9.5 FALL UNEARTHING AND BURIAL
3.9.6 SPRING UNEARTHING AND BURIAL

GRADE FOUR

4.9.1 UNEARTHING AND BURIAL
4.9.2 RECYCLING PROJECT

GRADE FIVE

5.9.1 CLASS RECYCLING PROJECT
5.9.2 CLASS CONSERVATION PROJECT
5.9.3 DECOMPOSITION AND ARCHEOLOGY
5.9.4 POLLUTION PROJECT

GRADE SIX

6.9.1 CLASS RECYCLING PROJECT
6.9.2 CONSERVATION
6.9.3 DECOMPOSITION: A SUMMARY
6.9.4 POLLUTION

CLUSTER TEN - MATTER SPACE, AND CONSTRUCTION

GRADE KINDERGARTEN

K.10.1	CUBBY ORGANIZATION
K.10.2	PATTERNS IN PUZZLES
K.10.3	MAKING PUZZLES
K.10.4	MAKING ENVELOPES
K.10.5	MAKING BOXES AND BAGS
K.10.6	VOLUME OF BOXES AND BAGS
K.10.7	PACKING AND STORING
K.10.8	LINEAR MEASUREMENT

GRADE ONE

1.10.1	METER-STRING CAN
1.10.2	OUTDOOR STUDY AREA MAPPING
1.10.3	TESTING FOR WATER
1.10.4	PLUMBING
1.10.5	WATER SYSTEMS
1.10.6	AIR
1.10.7	BUBBLES IN WATER
1.10.8	BUBBLES IN AIR
1.10.9	BUILDING WITH AIR
1.10.10	FLOOR PLAN
1.10.11	FLOOR PLAN MODEL
1.10.12	CARDBOARD HOUSE PLAN
1.10.13	MAKING A CARDBOARD HOUSE
1.10.14	PAINTING THE HOUSE
1.10.15	FURNISHING THE HOUSE
1.10.16	SEWING
1.10.17	WEAVING
1.10.18	WARMING AND COOLING THE HOUSE
1.10.19	LIGHTING THE HOUSE
1.10.20	SAFETY EQUIPMENT

GRADE TWO

2.10.1	DESK ORGANIZATION
2.10.2	NOTEBOOK ORGANIZATION
2.10.3	THE BALANCE
2.10.4	METER-STRING CAN
2.10.5	MEASURING VOLUME
2.10.6	SAFETY EQUIPMENT

GRADE THREE

3.10.1	ACIDIC AND BASIC SOIL
3.10.2	ACIDS AND BASES
3.10.3	ACID AND BASE REACTIONS
3.10.4	DILUTING ACIDS AND BASES
3.10.5	ACID AND BASE INTERACTION
3.10.6	DISSOLVING THINGS
3.10.7	THINGS IN LIQUIDS
3.10.8	CRYSTALS
3.10.9	RAIN IN A JAR
3.10.10	SUPERMARKET PLANNING
3.10.11	SUPERMARKET CONSTRUCTION
3.10.12	MEASURING DEVICES
3.10.13	SAFETY EQUIPMENT

GRADE FOUR

4.10.1	LINEAR MEASUREMENT
4.10.2	VOLUME MEASUREMENT
4.10.3	MASS MEASUREMENT
4.10.4	COLLECTING ROCKS
4.10.5	HARDNESS OF ROCKS
4.10.6	SPECIFIC GRAVITY
4.10.7	ROCKS AND SHARP EDGES
4.10.8	MAKING TOOLS FROM ROCK
4.10.9	MAKING FISHING TOOLS
4.10.10	CLOWNS:THINGS THAT FLOAT
4.10.11	CLAY
4.10.12	FIRE AND POTTERY
4.10.13	AIR AND FIRE
4.10.14	FIRE AND OXYGEN
4.10.15	PROPERTIES OF GASES

GRADE FIVE

5.10.1	LINEAR MEASUREMENT
5.10.2	VOLUME MEASUREMENT
5.10.3	CAMERA OBSCURA
5.10.4	CONTROLLING LIGHT WITH LENSES
5.10.5	MAKING A TELESCOPE
5.10.6	STABILIZING THE TELESCOPE
5.10.7	MAKING A MICROSCOPE
5.10.8	MAKING A HYGROMETER
5.10.9	MAKING A BAROMETER

GRADE SIX

6.10.1	MAKING MEASURING EQUIPMENT
6.10.2	MAKING BALANCES
6.10.3	MAKING AN ELECTROSCOPE
6.10.4	MAKING ELECTROMAGNETS AND CURRENT INDICATORS
6.10.5	MAKING ELECTRIC CELLS
6.10.6	MAKING AN ELECTRIC MOTOR
6.10.7	MAKING AN ELECTRIC SIGNALER
6.10.8	MAKING A SURVIVAL HABITAT

DASH

GRADE 1

MATERIALS LIST

DASH Grade 1 Equipment and Supplies

Classroom Supplies

Consumable

Chart paper, plain and 1" grid
Construction paper, asstd.
Crayons
Glue, white and Post-it
Index cards, 5" X 8" & 3" X 5", asstd.
Markers, asstd. colors, washable
Markers, waterproof, asstd.
Oak tag, chart size
Pencils
Paint, tempra, asstd. w/ brushes or sponges
Pushpins
Rubberbands, asstd.
Staples
String, asstd.
String, heavy cord preferred (11-21m / group)
Tapes, masking, cellophane

Permanent

Clock, classroom
Meterstick or tape, 2-8, (1 required)
Scissors, heavy duty (universal or bandage)
Scissors, student
Staplers

Consumable Supplies (Discount Department Store or Grocery Store)

Balloons, 1 pkg. asstd.
Chenille stems , 1 pkg. (opt.)
Chopsticks or 8-10" wood dowel pieces (1/4")
Crackers, saltines
Cups, styrofoam, 25-50
Dish detergent (Dawn or Joy), small bottle
Dowel or stick, 1/4" diam., 24" long
Facial tissues, 1 box
Foil, aluminum, 1 roll
Food coloring
Forks and spoons, plastic (50-60 each)
Gloves, plastic
Gravel, aquarium, 5-8 lbs. or sand
Nail, iron or fat needles
Paper plates, 6-8" diam, 2/student
Paper towels, 2-4 rolls
Pet food, litter
Plastic bags, sandwich size, resealable, 100
Plastic bags, resealable, asstd. sizes
Plastic bags, large, 2-3/student, (colors opt.)
Plastic bags, tall kitchen trash size, white
Plastic cups, clear, soft, 9-10 oz., 50-75
Plastic or paper cups, 3 oz., 1-2/student
Plastic wrap, 1 roll.
Potting soil, 1 cup/student
Seeds, bush bean or lima
Skewers, wood, 1 pkg.
Straws, plastic, 1 box
Tape, duct, 6-8 rolls
Tapes, asstd. colored plastic (opt.)
Thread, sewing needles, asstd. (opt.)
Yarn, asst. colors

Permanent Supplies*

- Aquarium (opt.)
- Clock, digital
- Cooking equipment, asstd.
- Dishpans, buckets or large bowls, 4-6
- Fan, electric (opt.)
- Garden hose
- Hand lenses, 1/2 students
- Hand tools for student use, asstd.
- Hot plate and small pyrex dish (opt.)
- Hot water source
- Ice source
- Iron, 1-4
- Lake materials: preformed wading pool or Large, heavy duty plastic cloth, 9'X12' or larger, shower curtain, tarp, drop cloth Boards: 2"X (6" or 8")X 3' (2 ea.) & X 6' (2ea)
- Magnetic compass (opt.)
- Magnets
- Maps, asstd. types
- Map of school district
- Mirrors, small, 8-12
- Overhead projector
- Puppets, animal or others (opt.)
- Scale, bathroom
- Stopwatch (opt.)
- Teeth model (optional)
- Thermometers, asstd. cooking, fever, etc.(1 ea.)
- Thermometers, small, 8-12, w/ °C & °F
- Tongs, 1-4

***Many of these items can be borrowed or shared within a school.**

Recycled Materials

- Arts & craft supplies, misc., asstd.
- Aluminum pie pans and asstd. containers
- Bags, paper, plastic, asstd. sizes
- Boxes, corrugated cardboard, asstd. incld. appliance size
- Cans, metal, gal. (w/lids) & other asstd.
- Cardboard milk or juice cartons, asstd. sizes
- Corks
- Fabric scraps
- Film canisters
- Jars, gal.,qt. and other asstd.
- Magazines with colored pictures
- Newspapers
- Nylon stockings
- Paint, latex, asstd.
- Plastic containers, asstd.
- Screening, fiberglass
- Styrofoam, asstd. pieces and containers
- Tubes, cardboard, asstd.

Special Purchase

- Animal skulls w/teeth (opt.)
- Calendar paper-24" roll or computer
- Calendar, 1 year on a page (opt.)
- Cobalt chloride paper, 1 vial
- Glycerin or light corn syrup, 2 oz. (opt.)
- Newspaper, access to daily or internet/phone
- Pet, cage, supplies
- Thermometer,large, w/ °C & °F (permanent)
- Tubing, clear plastic, asstd. sizes and lengths

Other

- Alcohol (small amt.)
- Bleach (small amt.)
- Cooking foods (usually requested from students)
- Liquids, asstd., (usually requested from students)
- Toothbrushes, students personal
- Toothpaste

DASH

GRADE 1

COMPLEMENTARY MATERIALS

DASH
ON
HOME

1

University of Hawai'i • College of Education
Curriculum Research & Development Group
Science Projects
1776 University Avenue • Honolulu, Hawai'i 96822
Telephone: (808) 956-6918 • (800) 799-8111
Fax: (808) 956-4933 • (808) 956-4114

May 9, 1996

Dear *DASH* Teacher:

DASH holds to the notion that the study of science and technology should not be limited to the four walls of the classroom. Scientific and technological ways of knowing and doing are applicable in any part of the student's 24-hour day, and the aid of parents and others can help extend the experience of the student. The *DASH on HOME* newsletters are provided as a supplement to the *DASH* materials. Use them if they fit your needs.

Dr. Ann Baldwin Taylor of Carnegie Mellon University has headed a project to produce a series of *DASH on Home* newsletters for parents. Copies of these along with a letter of explanation follow. The newsletters are designed to provide your parents with extensional *DASH*-like activities that can be done in the home as parent-child inquiries. Though formatted formally, they can be cut up and reassembled in any way that meets your needs. Enclosed in this packet you will find

1. Copies of the ***DASH on Home*** family newsletters for you to copy and send to families as needed.
2. A "Dear Family" letter which you may want to use to introduce the newsletters to families. (Copy or write your own letter.)

Hints for successful use of ***DASH on Home***

1. To let families know what to expect from the newsletters, we have enclosed a "Dear Family" letter that can be sent home with the first newsletter.
2. Talk with your students before sending any newsletters home. You may want to discuss the topics and ask the children to let you know about the activities that are completed at home. You may want to ask your children to bring reports and projects back to share with the group.
3. Familiarize yourself with each newsletter so that you can have discussions and answer questions from parents and children as they are doing activities at home.
4. You will have two newsletters for your grade. We recommend sending one home in the Fall and one in the Spring.
5. Some teachers have found that including personalized information on an additional newsletter page has been very successful. By adding names, pictures, local maps, or school logos, ***DASH on Home*** becomes your own. The "sample personalized newsletter page" in this folder may give you ideas.

Sincerely,

Francis M. Pottenger III, Director

DASH
A Science, Health, & Technology Program
An NDN Developer/Demonstrator Project

Dear Family,

During the school year I will be sending a family newsletter home with your child. It tells about science, health, and technologies studied at school and suggests some activities you may try with your child. I hope that these activities will help your child understand that the ideas studied at school are part of everyday life.

Here are some things that may make these activities more fun.

- Involve the whole family.
- Begin with the activities that are most interesting to your child.
- You or your child may think of activities or experiments that will extend those that are suggested in the newsletter. For example, collecting stones or leaves may grow into a year-round project.
- If your child is interested in a particular topic, don't forget your local library as a resource. Your library will have many books about topics your child maybe interested in. Your child may want to share the books at school.
- Don't worry about completing all the suggested activities. You may want to save the newsletters to do some of the activities later.

I hope you enjoy helping your child learn with the *DASH on Home* newsletters.

Sincerely,

SAMPLE OF HOW YOU CAN "PERSONALIZE" AN ADDITIONAL PAGE TO A NEWSLETTER

DASH NEWS from ROOM 10

Display a child's drawing of a class pet here.

Remember to give credit to the child artist.

OUR NEW PET Our class has a "new" student. It is a Russian Dwarf Hamster. Rm. 10 has named its new friend Bella. She resides in her very own clear plastic house (which makes it easy to observe her actions). There are separate areas for eating, exercising and sleeping. We'll tell you more about Bella in the next newsletter.

A FEAST FIT FOR A KING!

Our class at All American Elementary School enjoyed a delicious ending to their study of food and teeth. A first annual Friendship Luncheon was prepared and cooked by the kindergarten students under the supervision of DASH teachers Mrs. Smith and Miss Jones. In coordination with the DASH food cluster, students listened to and dramatized the story, "Stone Soup, " and then prepared their own version in the classrooms. They also made homemade butter, peanut butter and fruit salad. With much help from parents, the students wearing their own apron creations, made individual loaves of bread. All of these nutritious items were part of a feast during a sit-down lunch at school. Parents became the waitresses and busboys to add the final touch to a super and filling lunch!

Be sure to include the children's and parent's names to the story .

Be sure to use a child's drawing here and give the artist credit.

SPRING HAS BLOOMED AT OUR SCHOOL!

The bulbs which the children planted in the fall are adding a colorful touch to the playground! We would like to keep the garden colorful through the summer months. In order to do this, we need top soil. The children have planted marigolds indoors and are almost ready to transplant them to the area around the flag pole. If we could put a layer of top soil down our plants would have a better chance of survival. If you can help us, please give the school a call- 555-5555. Thank you!

DASH
DEVELOPMENTAL APPROACHES IN SCIENCE AND HEALTH
ON HOME
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ACTIVITIES FOR FAMILIES
VOLUME 1, NUMBER 1

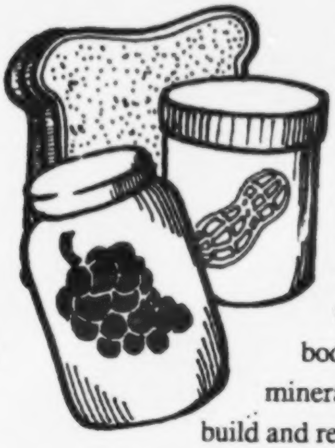
THE KITCHEN CAN BE USED AS A LABORATORY AT HOME. INVOLVE YOUR CHILD IN OBSERVATION, EXPLORATION AND LEARNING ABOUT FOODS AND SANITATION WHILE YOU PLAN AND PREPARE MEALS TOGETHER.

This newsletter has been designed for the *Developmental Approaches in Science and Health* (DASH) curriculum that is being used in your child's school. DASH is a new curriculum for kindergarten through sixth grade. DASH integrates science, health and technology subjects into all aspects of the school program.

You could "bring DASH on home" by including science activities in your daily life. This newsletter will give you some ideas. Save the newsletters and take your time with them.

DASH has several units or "clusters." The activities in this newsletter complement several DASH clusters. Look for **bold letters** to indicate the DASH ideas.

If you have any questions or comments about *DASH on Home*, please contact: DASH c/o The Children's School, Carnegie Mellon University, MMCC 17, Pittsburgh, PA 15213.



DASH FOOD GROUPS

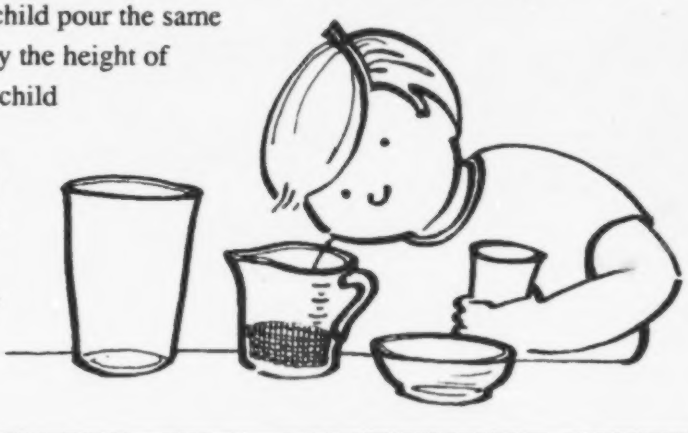
In school your child is learning about three kinds of food that are essential for our bodies—**activation** foods, **regulation** foods and **fabrication** foods. Activation foods are high in starches, sugars, fats and oils (grains, cereals, butter, sugar, etc.). These foods provide energy to our bodies. Regulation foods are rich in vitamins and trace minerals (fruits and vegetables). They keep our bodies working. Fabrication foods are rich in protein and minerals (milk, eggs, fish, meats, beans and nuts). These foods build and repair our bones and muscles.

Make a game of identifying the food groups during meals. Ask your child to suggest a good meal made up of foods from each group. A peanut butter and jelly sandwich, for example, uses all three groups. (**Food and Nutrition**)

EXPLORING VOLUME AND SIZE

Explore volume and size. Help your child collect pans, plastic containers and jars of different shapes and sizes. Use colored water and a measuring cup. Have your child pour the same amount of water into each of the containers. Ask why the height of the water changes in different containers. Help your child discover which containers hold the most or least water. What happens when the water is poured from a tall thin container into a shallow flat container that holds the same amount?

Extend this activity by having your child explore volume using plastic containers in the bathtub. (**Matter, Space and Construction**)



Suggestion: These activities can all be repeated frequently. Increase the complexity as ideas are mastered. Your child is likely to enjoy the repetition and you will see growth in learning and understanding over time.

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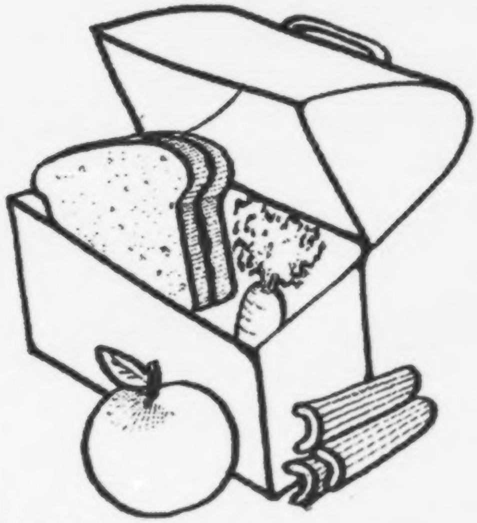
VOLUME 1, NUMBER 1

FOOD GAME

See if your child can identify foods that fit into the following categories:

Roots (carrots, parsnips)
Stems (celery, rhubarb)
Flowers (broccoli, cauliflower)
Seeds (nuts, peas, beans)
Fruits (apples, pears)

Look for these foods in the picture of the lunchbox, during meals and at the market.
(Food and Nutrition, Plants)

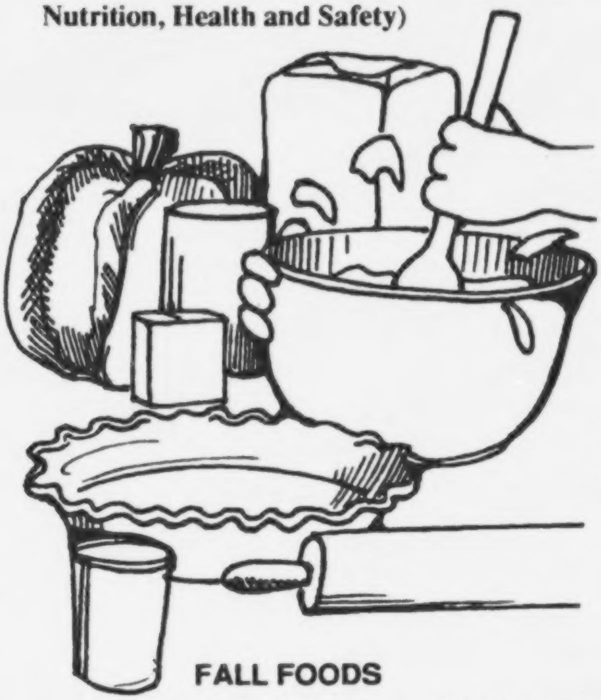


LUNCH TALK

Talk with your child about lunch. What does your child consider a good lunch. How are bag lunches different from cafeteria lunches? Talk about what *you* usually eat for lunch. **(Food and Nutrition)**

"LET'S COOK TOGETHER"

A cooking project may be as simple as opening a can of soup, measuring milk or water, or stirring thin It may be as complex as making bread or preparing an entire meal. Remind your child that we always wash our hands before cooking, and then have your child measure ingredients, pour them into the mixing bowl and help mix them together. Have your child help with the cleanup afterwards as well. **(Food and Nutrition, Health and Safety)**



FALL FOODS

Certain foods are seasonal. If you have a garden or live near a farm or orchard, harvest fall foods as a family. While shopping, look for foods that we usually see only in the fall or the winter (pumpkins, winter squash). Find other foods that are harvested in the fall but are available all year (apples, grapes, pears). **(Time, Weather and Sky; Food and Nutrition; Plants)**

A SIMPLE GIFT

Include a pretty leaf in a letter.

DASH

DEVELOPMENTAL APPROACHES IN SCIENCE AND HEALTH

ON HOME

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ACTIVITIES FOR FAMILIES

VOLUME 1, NUMBER 2

OBSERVING BUILDING CONSTRUCTION CAN BE A LONG-TERM FAMILY PROJECT. DISCUSS THE CONSTRUCTION OF YOUR HOME AND OTHER BUILDINGS. LOOK AT FLOOR PLANS, WIRING, PLUMBING AND BUILDING TECHNIQUES.

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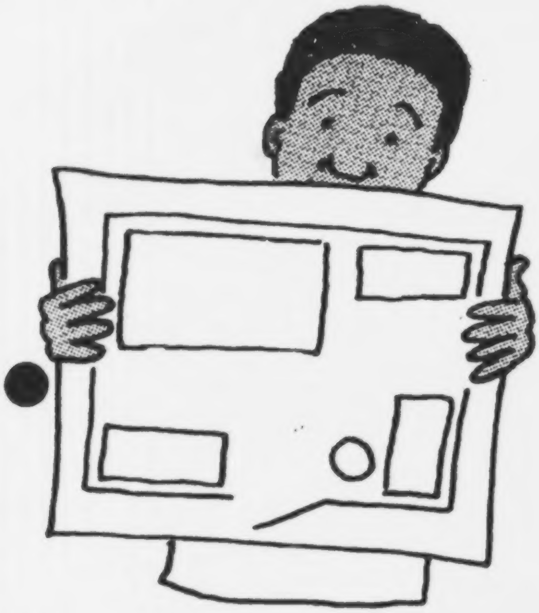


MAKING A FLOOR PLAN

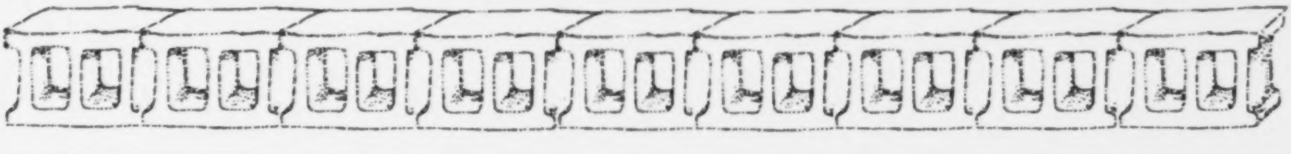
Work with your child to draw a floor plan. Start with an outline of the child's room. You can have your child measure the room, or you can just "eyeball" the size and shape of the room. Grid paper marked in squares helps in laying out the plan. Usually you can make the length of one square equal a foot, and the length of three squares equal a yard. A meter in the metric system is about the same as a yard.

Be sure to have your child take the finished project to school to show to the rest of the class. If your child is interested, do other rooms or the entire house. **(Matter, Space and Construction)**

THE ESSENTIAL FOUNDATION

Visit a construction site to see how a foundation is made. Ask for your child's ideas about the purpose of a foundation. Ask what would happen to a building without a good foundation. Besides giving a building a strong base to stand on, foundations help to protect buildings against wind, floods and earthquakes.

Investigate the foundation of your home with your child. Do you have a basement or do you have a slab foundation right on the ground? See whether your child can tell what your foundation is made of. Poured concrete and concrete blocks are commonly used now, but in older buildings you may see stone foundations. **(Matter, Space and Construction)**



Suggestion: Involve your child in everyday home activities whenever possible. Use these natural situations for learning, observation, exploration and analysis.

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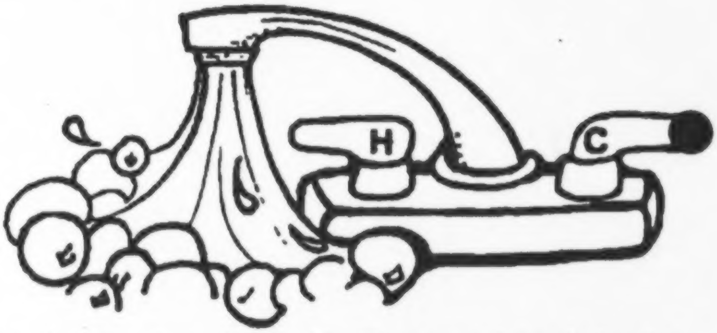
VOLUME 1, NUMBER 2



WHERE DOES HOT WATER COME FROM?

Together find where the water comes into your house or building from the outside. Then trace the path that the water has to take to get from the street to the tap. Somewhere along that path, some water gets heated. Help your child find your hot water heater and discover where the cold water comes in and where the hot water goes out. **(Matter, Space and Construction)**

HOT WATER CONSERVATION

Conserving hot water conserves two resources—water and energy. Ask your child how your family might conserve water. Talk about using less hot water, turning down the setting on the water heater, turning the heater off if you go on vacation, and insulating the heater and hot water pipes. (**Energy and Communication; Conservation, Recycling and Decomposition**)

KEEPING WARM, KEEPING COOL

Discuss with your child different ways to heat a house. Some may be ways that you use and some may be ways that other people use or have used in the past. Do you have a furnace, radiators, a woodstove or a fireplace? Talk about using storm windows, double-glazed windows, insulation, and other ways to keep the warmth in and the cold out.

Ask your child about ways we can cool a house. Do we open windows? Do we use fans or an air conditioner? **(Matter, Space and Construction; Energy and Communication)**

SEASONAL CHORES

Are there seasonal chores that you do to prepare your home or yard for the spring season? As your child works with you, ask why we take down storm windows and put up screens. You may be preparing the ground for a garden. You may be ordering seeds or setting out plants. Involving your children in these jobs helps them understand what is being done and why. Ask what the relationship of each chore is to the season. (**Time, Weather and Sky; Plants**)